LIBRARY OF CONGRESS
JUN 21 1880
SMITHSONIAN DEPOSIT.

THE AMERICAN GAS LIGHT JOURNAL

REDMAN & KENNY, N.Y.

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

VOLUME XXXII.—No. 9.
Whole No. 501.

NEW YORK, MONDAY, MAY 3, 1880.

$3 PER ANNUM
IN ADVANCE.

A. M. CALLENDER & CO., Proprietors.
G. WARREN DRESSER, C.E., Editor.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European Countries, $3.50 (15 shillings—18 francs). All payments to be made in advance. Single copies, 15 cents.

Remittances should be made either by post-office order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

The American News Company, Nos. 39 and 41 Chambers Street, New York, are agents for this Journal. Newsdealers will send orders to them.

Collections are invariably made directly from this office, for subscriptions, advertisements, etc. We have agents to solicit the same, but they are not authorized to receipt for money.

Correspondence.—Wishing to make this Journal a gazette of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, correspondence is solicited for publication from all who make the study of these subjects a pleasure or a profession.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND CLASS MATTER.

CONTENTS.

☞ An asterisk (*) denotes an illustrated article

Third Annual Meeting of the Western Gas Association..... 193
EDITORIALS—
Annual Report of the Paris Gas Company..... 193
The Western Gas Association..... 194
The Explosion at the New York Gas Company's Works..... 194
A New Paper for Boys and Girls..... 194
Some Electrical Measurements of One of Mr. Edison's Horseshoe Lamps..... 194
The Gas Question at Washington, D. C..... 194
Caution from Mr. Latimer..... 195
Gas and Electricity..... 195
Compressed Air Locomotive..... 195
Forty-fifth Annual Report of the Trustees of the Philadelphia Gas Works..... 196
Dr. Adams on Units of Heat..... 198
Experiments in Improved Street Lighting at Birmingham..... 199
The Disposal of Sewage..... 200
American Society of Civil Engineers..... 201
The Prospects of Electric Light..... 201
Public Lighting in London and Paris..... 202
Four Men Nearly Perish from Escaping Gas, etc..... 202
Electric Lighting..... 203
Gas Commission..... 203
CORRESPONDENCE—
Coke for Domestic Use..... 205
Gas Engines..... 205
A Bill Regulating the Price of Gas..... 205

[OFFICIAL NOTICE.]

Third Annual Meeting of the Western Gas Association.

SECRETARY'S OFFICE, 901 PINE STREET,
ST. LOUIS, MO., April 24, 1880.

The Third Annual Meeting of this Association (continuing three days) will be held at the New Denison House, Indianapolis, Ind., Wednesday, May 12th, 1880, at 10 o'clock, A.M. A full attendance is requested.

LEE A. HALL, *Secretary.*

ANNUAL REPORT OF THE PARIS GAS COMPANY.

At the Annual Meeting of the Company, held on the 25th of March, the Administration presented their Report for the year ending December 31st, 1879.

After referring to the very exceptional severity of the winter, which entailed an unusual expense, and reduced the net receipts for coke very materially, the remark is made that, while it would have been possible for the managers to have made up this loss by increasing the price of coke, still, from the fact that this fuel had become almost the only means of heating employed by the poorer classes, they did not deem it expedient to impose additional burdens upon those who were already suffering so severely in other respects from the rigors of a cold winter. The report then considers the general business of the year, taken as a whole, after which it gives the details of each department.

During the year the Company sent out 218,813,875 cu. meters of gas, or, in round numbers, 7,725 millions cubic feet, being an increase of 242 millions cubic feet over 1878.

The day consumption between the hours of extinguishing and lighting the public lamps amounted to 1,890 millions, or about 24 per cent. of the whole, being an increase in this respect of nearly 72 millions of the amount consumed in the corresponding hours for the previous year. This increase in day consumption is attributed to the industrial and domestic applications of gas, which have largely increased in the last year.

The receipts for gas were 55,619,588 francs—$11,123,917. The increase in the number of consumers for the year was 7,796, making the total number of consumers 139,230. The report then says—"Be reassured that our industry is in the plenitude of its development; its domain is constantly extending, and all the inventions which spring up from time to time with the pretense that they will replace gas, do not in any manner retard the development of our undertaking."

The number of public lamps on December 31st, 1879, was 46,132, an increase of 1,128 over the year 1878.

Conduits Montantes.—For a number of years the Company has carried out the practice of putting in, at their own expense, the services of main pipes leading to the upper stories of buildings where the occupant agrees to use at once at least three burners, or where the proprietor agrees to make the connections at his own expense, for three burners in at least three apartments. They have put in during 1879, 1253 of these special service pipes, and the total number erected by the Company, up to December 31st last, was 12,913.

Separate accounts of these consumers are kept, and the revenue from this source last year was 8,229,106 frs.—$1,645,821. The average expense of putting in the 12,913 services has been 598 francs each, or a little more than $100 a piece.

The manufacturing capacity of all the works of the Company was 8,430 millions feet per annum, which, by the end of 1880, will be increased to 9,200 millions, and the total length of street mains is about 1125 miles.

The working expenses and receipts are given as follows:

Materials, $4,349,750; service at the works, including labor, ordinary repairs, purification, etc., $1,112,605; cost of street lights and mains and services, $398,918; expenses of general office, interest on loans, etc., $2,049,200; municipal and state taxes, $1,039,603, making total working expenses

$8,950,076. From this is to be deducted the amount received for residuals, which reaches the handsome figure of $4,118,645.

Some of the items of the receipts for residuals are as follows:

Coke, $2,613,535; tar, $521,920; ammonia water, $73,246; gas fitting, piping, stop-cocks, setting meters, $474,569; briqueterie, $41,968; chemical products, $230,719; various other sources, $162,688.

The value of these products, added to the amount received for gas gives the total receipts for the year, which, after deducting all the expenses, leaves as the profit of the year's business, $6,280,000. Of this amount the shareholders receive a dividend amounting to $2,480,000. The balance, $3,800,000 over and above the dividend, is divided equally between the Municipality of Paris and the stockholders. In this way the city of Paris receives as its share of the profits for the year 1879, $1,900,000, in addition to taxes which were paid to the city to the amount of $905,000.

THE WESTERN GAS ASSOCIATION.

The Third Annual Meeting of this Association will begin at Indianapolis, Ind., on May 12th, and continue three days. This Association comprises within its limits a very large number of gas companies, and we are sure that it will be for the advantage of every one to be present who can possibly so arrange his duties as to get there. There is a very decided advantage in these gatherings over and above what is to be derived from the formal papers and discussions, and that is in the personal contact and intercourse with others engaged in similar pursuits, whereby one may have an opportunity of gathering valuable information, and also, perhaps, of getting rid of incorrect notions.

Aside from these advantages there is sure to arise a spirit of emulation where men come together—to compare notes. And here we would recall the suggestion made by the President of the New England Association, viz., that when you come together to compare notes, be sure 1st, that you have your notes with you, and, 2dly, be sure that the notes are exact, clear, and explicit; then, everyone can state just what he has done. We wish the Western Association a full and successful meeting, an account of which we hope to give our readers in detail.

The Explosion at the New York Gas Company's Works.

ENGINEER'S OFFICE, 21ST STREET COR. AVENUE A,
NEW YORK, April 21st, 1880.

Mr. Editor. In answer to the many inquiries which we have had, and at your request, made to the President of this Company, the following account is sent you of the accident which occured in the scrubber house of our works on the afternoon of Wednesday, April 14th, about three o'clock. This scrubber house is situated on First Avenue, near the corner of 21st Street, and contains two scrubbers, each fourteen feet in diameter and forty feet high. On a platform above was an engine for revolving the trays and water jets in the scrubbers, and a large iron water tank supported by iron stanchions and braces.

One of the scrubbers was being opened for repairs to the water jets, and we had just removed the manhole plates from the top and bottom when an explosion occurred which set fire to the roof.

The works were stopped at once by slacking off the lids of the retorts, and closing the valves to each section of apparatus. The rapidity with which this was done may be judged from the fact that the retorts were open and the principal valves closed before the first fire engine arrived, while the alarm was sent out within a minute after the explosion.

The firemen who responded to the call evidently thinking that a fire in a gas works must be very serious, sent out two more alarms, and with this increase of force succeeded in getting the fire out in about thirty minutes, though it was nearly five o'clock before they left us.

The fire was confined to the roof of the building and the platform over the scrubbers. The engine, which was on the platform, was not materially injured. The water connections to the scrubbers were broken, but by seven o'clock we had made new ones, and the works were started again.

Beyond the destruction of the roof and platform our property sustained no damage; but, I am sorry to say, that three of our men were injured—fatally.

I am satisfied that the accident was not caused by the carelessness of the men, and can only account for it on the supposition that a spark from a locomotive on the elevated road, which passes close to the building, ignited the gas issuing from the scrubber.

Some of the papers have stated that we were experimenting with naphtha. This is not true, as no naphtha had ever been used for making gas at these works, and the storage tanks intended for the new process which is soon to be introduced are situated two blocks off.

Yours respectfully,
WM. T. LEES, *Asst. Supt.*

A NEW PAPER FOR BOYS AND GIRLS.—In these days when the country is flooded with so much of the diluted, trashy, reading matter that appears at every turn, it is a satisfaction to find a new enterprise started for giving the young people a good, healthy and, at the same time, manly weekly paper. "Golden Days," published by Jas. Elverson, Phila., Pa., gives every promise of being such a journal, and we trust it will meet with the encouragement that it deserves. The subscription is $3 a year.

Some Electrical Measurements of One of Mr. Edison's Horse-shoe Lamps.

The following errors or misprints in the above article, as given on page 170 in our last issue, require correction:

In second column, line twelve from the top, the word "lost" should be "gained," it being the gain of weight by the kathode, not the loss by the anode, which was taken, although they were nearly equal.

In the second column, line twenty-fifth from the top, where now stands "0·9 =," there should be filled in the missing type to make it read "$0{\cdot}905^{3}=$."

It should also be noticed that the method of deducing the average candle power as the arithmetic mean of the extremes was not adopted as a mere assumption, but was the result of a series of measurements made in all azimuths, which showed it to be a fair approximation.

[Communicated Article.]

The Gas Question at Washington, D. C.

Although Congress, by Act approved June 23, 1874, prescribes the illuminating power that shall be required and the amount of impurities that may be allowed in the gas sold by the Washington Gas Light Company, and at the same time fixed the price that may be charged by them, which price depends on the market price of gas coals; and although the gas furnished by them is better than required by law, and the price less, yet, notwithstanding these facts, Congress no sooner meets than certain persons, claiming to have the interests of the gas-consuming public at heart, rush to Washington and apply for a charter to enable them to put down competing gas mains and relieve the oppressed inhabitants of that fair city from the monopoly of the Washington Gas Light Company.

It sometimes happens, and was the case during the past winter, that the parties applying were known in other cities to be in league with other existing gas companies for the purpose of advancing prices; hence in Washington they were assuming a virtue they did not possess, which the members of the District Committee were not long in discovering.

The facts of the case were these:—

Parties under the name of the Municipal Gas Company of the District of Columbia, were before the District Committee to urge their claims. To assist them, a *large consumer* in the city (who is a corporator in their company) stated that the gas furnished by the Washington Gas Light Company was very poor in quality, and that his annual gas bills were the same, no matter what price was charged per 1000 feet. He further stated that his gas frequently went out, and that when he made complaints at the Gas Office they were not attended to. He admitted that he had never made a complaint to the United States Inspector of Gas and Meters, an officer appointed by the government to protect the consumer. In reply to these statements the Gas Company showed by abstracts from their books, all sworn to, that the statements were not correct; that with every reduction in price the bills of the consumer above named were reduced, and in 1879 they were $1,677.23 less than in 1869. The record from the complaint book kept by the Company showed that each complaint from him had received immediate attention. As to the quality of the gas for the year 1879, they submitted the report of the United States Inspector, an officer appointed by the President and confirmed by the Senate, whose sworn duty it is to inspect the gas *daily*, Sundays excepted, as follows:

OFFICE OF INSPECTOR OF GAS AND METERS,
410 TENTH St., WASHINGTON, D. C., Jan. 13, 1880.

Report of the illuminating power and purity of the gas supplied by the Washington Gas Light Company from January 1, 1879, to December 31, 1879:

Average illuminating power in candles	16.61
Average grains of ammonia in 100 cubic feet	2.43
Average grains of sulphur in 100 cubic feet	13.78

Total number of consumers' meters tested during the year at their request, 56. Of which 22 registered 5.40 per cent. fast; 5 registered 4.72 per cent. slow; 29 registered within the limits allowed by law.

S. CALVERT FORD,
U. S. Inspector of Gas and Meters for Dist. Columbia.

The law requires that the illuminating power shall be 16 candles, with a 15-hole argand burner consuming 5 cubic feet per hour, and allows 5 grains of ammonia and 20 grains of sulphur to the one hundred cubic feet of gas.

In one respect the report is remarkable. The Company have over 11,000 meters set; the Inspector's office is centrally situated, and many of the gas consumers pass it monthly, if not daily; and yet in 1879 but 56 felt that they had any cause of complaint against their meters.

It is impossible for a community to make a permanent gain by increasing

the number of its gas companies. See results in New York and Brooklyn.

The price of gas in Washington is $2 per 1000 cubic feet. Its illuminating power, as tested by Dr. Chas. M. Cresson and Prof. Henry Morton, with a 15-hole argand, was 17¼ candles; with a 33-hole argand was 20¼ candles, both consuming 5 cubic feet per hour.

Congress having full control of price and quality of the gas manufactured and sold in the District of Columbia, after a careful examination of the subject declined to grant a charter to the Municipal Gas Company, as well as to the Atomic Steam Coal Gas Company, as will be seen by the following report:

MUNICIPAL GAS COMPANY AND ATOMIC STEAM COAL GAS COMPANY OF THE DISTRICT OF COLUMBIA.

April 9, 1880.—Laid on the table and ordered to be printed.

Mr. E. L. Martin, from the Committee on the District of Columbia, submitted the following report (to accompany bills H. R. 2509 and 2514):

The Committee on the District of Columbia, to whom were referred the bills H. R. 2509 and H. R. 2514, together with various petitions, protests, and other papers, all relating to the organization of gas light companies in the city of Washington, having had the same under careful consideration, respectfully submit the following report:

Each of the bills provides for the incorporation of a new gas light company.

The object to be sought in devising means for the illumination of Washington City is an illuminating material of good quality that shall be sold at a fair and just rate for public and private consumption, and distributed throughout the city in such manner as will best subserve the interests and convenience of its inhabitants.

Will this object be secured by a plurality of gas light companies? In the opinion of your committee it will not. The quantity of gas consumed will remain the same, while the cost of its manufacture and distribution will be increased by reason of the works, pipes, appurtenances, and labor necessary for each additional company.

The injury to the city, the interruption to public travel, the detriment to all business by tearing up streets, pavements, and reservations will be increased in the same ratio.

The advantages offered to be set over against these manifest objections are, in the one bill, a cheaper gas for all consumers; in the other, gas of greater illuminating power, to be furnished at a cheaper rate for use in the public buildings and reservations, the price to private consumers remaining as at present.

If these advantages were of real and enduring value, and were, moreover, such as could be secured in no other way, even then the wisdom of their purchase by the proposed expenditure of capital and convenience would be doubtful. But when it is seen that they are easily within reach by less expensive methods, and are nominal and transient in the plans submitted, the unwisdom of securing them in that way is clearly apparent.

The history of gas light companies, so far as known to your committee, is almost invariable in this regard, that where opposition has started it has been either for the purpose of compelling, or has resulted in, a purchase of one company by the other, or a division of territory between them with uniform rates. So that, although competition may lower the price of gas for a time, it always ends in a compromise between the companies and an increased rate for gas to the consumers to pay the interest on the unnecessary outlay of capital. This fact has long been recognized in Europe, where London is the only city of importance in which more than one gas light company is allowed.

Your committee think with Mill, that "it is an unthrifty dispensation of the public resources to have several costly sets of arrangements kept up for the purpose of rendering to the community one service, when one set could perform the service equally well." The true protection for the interests of all concerned is to treat the production of an article, which is now almost a necessity in every household, as a public function. If it be a function that the government itself cannot properly undertake, it can be delegated to one company stringently regulated by law.

This view Congress has already practically enforced by chartering the Washington Gas Light Company and prescribing regulations which it can change at will for the purity, power, and price of the gas to be furnished thereby.

It is shown by the reports of the inspector of gas and meters appointed by the President and confirmed by the Senate of the United States, that the Washington Gas Light Company fully meets the requirements of the law on the subject, and that the city of Washington is supplied thereby with gas of good quality at a price as low as that charged in any city in the United States.

For the reasons aforesaid, your committee are of opinion that no other gas light company should be incorporated in the city of Washington, and therefore recommend that neither of the above-named bills do pass. B.

Caution from Mr. Latimer.

To the Public:—As an active executive officer of the International Institute for preserving and perfecting weights and measures, I wish to warn the public, and especially mechanics and other workingmen, against the attempts now making to introduce the French metric system into this country by a compulsory act of Congress. This is being done under false pretenses, by wording their petitions for the people to sign so as to convey the idea that they are asking for a decimal system of weights and measures in accord with our decimal system of money, when the measure they are trying to secure is the French metric system—pure and simple, with all its barbarous Greek and Latin names unknown to our people, and illy adapted to our language. To accomplish this purpose petitions to Congress asking simply for a *decimal* system of weights and measures, as above stated, are being circulated, while the country is being flooded with books, pamphlets, and other publications on the subject, worded in the most specious and attractive style, so as to draw the most money from the unwary. The purchase of such documents is only a waste of money, tending to evil instead of good, making the rich richer and the poor poorer. Besides, many well informed persons are strong in the belief that this whole movement is a deliberate attempt to subvert our republican government; to bring our people into a condition where such arbitrary measures can be forced upon them at the point of the bayonet, if need be. Charles Latimer.

Cleveland, Ohio, April 12, 1880.

Gas and Electricity.

In his recent inaugural address before the Society of Telegraph Engineers, London, President W. H. Preece said:

The electric light has been making considerable progress, and is gradually forcing itself into practical use, in spite of many of the drawbacks to its employment that have yet to be removed. The lamp of the future has not yet been produced, though steadiness and duration have very much advanced during the past twelve months. There is very little room for improvement in the generating machine, for both the Siemens and Gramme machines convert about 90 per cent. of the energy thrown into them into electric currents, and this is a duty which no other kind of machine can show.

On of the most notable and useful applications has been on board ship, to further the operations during the night in laying and repairing cables. I was present on board the steamship Dacia, in the Mediterranean, when this was done, and the success was unequivocal.

The Brush machine has recently been introduced into this country, and its performances are certainly wonderful. It produces an electromotive force of over 800 volts, and I have seen it maintain 20 very steady arcs joined in series. Sixteen appear to be its efficient limit, and this number of lamps, giving over 1000 candle power, are easily maintained by an expenditure of 13¼-horse power. The performances of the Brush light are certainly the most advanced form the electric light has yet taken. There are over 800 of these lights in the United States, and it is worthy of notice that it has quietly crept into existence without the aid of the ubiquitous and omniscient newspaper correspondent, or the transmission of any sensational telegrams, to the detriment and discomfort of gas shareholders.

It is assumed by many that the electric light is devoid of heat; but Professor Dewar has shown that a Siemens arc radiates heat equivalent to 3 horse power per minute. Moreover, the use of such powerful currents, unless carefully directed, are dangerous to life and limb, and may even, unless protected, result in fire.

Gas is not going to be affected by the electric light. The proper function of gas is to generate heat. Ninety-four per cent. of the ingredients of gas are consumed in generating heat, and only 6 per cent. in producing light. It is remarkable that so amenable and tractable an agent for heating purposes has not been more utilized, but the fact is that the public is ignorant of its properties, careless of its employment, and callous of its defects. It is not too much to say that 50 per cent. of the gas manufactured is absolutely wasted for illuminating purposes by the wild extravagance with which it is burnt, and by the want of those systems of regulation which have been introduced to compensate for the irregularities and excesses of pressure.—*Scientific American.*

Compressed Air Locomotive.—Col. Beaumont, M.P. for South Durham, has invented and patented a compressed air locomotive, which according to a contemporary is capable of running 10 miles without requiring replenishing, and drawing 2 loaded tram-cars at speed which can be easily regulated. At an experimental trial the engine is stated to have been started with a pressure of 900 lbs. to the inch in the reservoir, and when stopped in 45 minutes 600 lbs. still remained. The revolutions per minute were calculated at 110, and the total number of revolutions at 4730, which, if the engine had been running on a road, must have been equal to over 7 miles traversed.

Forty-Fifth Annual Report of the Trustees of the Philadelphia Gas Works.

To the Select and Common Councils of the City of Philadelphia:

The Trustees of the Philadelphia Gas Works present the Forty-fifth Annual Report of their proceeding, and the statement of the financial condition of the works under their control, and the results of the business carried on by them for the year 1879.

Since the last annual report there has been expended—

For works		$16,047 32
For mains		32,055 47
For services		40,244 71
Making a total of		$88,347 50
From which deduct amount received on account of services		14,249 08
Leaving a balance of		$74,098 42

The quantity of gas manufactured during the year 1879 was 2,180,625,000 cubic feet, an increase of 13,086,000 cubic feet over 1878. The street mains laid during the past year were 37,080 feet, making the entire length of the mains laid through the city and in use by the gas works 704¼ miles.

The illuminating power of the gas manufactured by the Philadelphia Gas Works during the year has been equal to that of 16¼ candles. They here submit the average illuminating power of gas made at the different works under their charge during the year 1879, reported from tests made by Prof. Robert E. Rodgers, of the University of Pennsylvania, and Prof Lemuel Stephens, of Girard College, the lowest average in every case being given.

	Candles.		Candles.
Average for January	16.31	Average for July	16.13
" February	16.29	" August	16.23
" March	16.22	" September	16.32
" April	16.18	" October	16.24
" May	16.25	" November	16.15
" June	16.41	" December	16.23

Average for the year, 16.24 candles.

The Cashier's report herewith submitted shows that the loans created by Councils from time to time, for the construction and extension of the works, for the laying of mains and service pipe, as well as for the purchase of the works of other companies, amounted to $7,370,000 00

There have been in addition expended on the works now operated by the Trustees, the amounts provided by the ordinance of the 20th of March, 1855, for the purchase of the Spring Garden, Moyamensing, West Philadelphia, and Frankford Gas Works, viz.: $450,000 00

And for the purchase of the Southwark and Moyamensing, Germantown, Manayunk, and Richmond Gas Companies.. 300,740 00

Making the total amount loaned to the Gas Works on the credit of the city, since their first construction $8,120,740 00

Of which there has been paid off out of the sinking fund, the amount of loans Nos. 1, 1, 3, 4, 5, 6, 7, and 8, as they respectively fell due $1,370,000 00

And also the amount of the loan provided by ordinance of March 20, 1855, for the purchase of the Spring Garden, Moyamensing, West Philadelphia, and Frankford Gas Works 450,000 00

1,820,000 00

Leaving amount of loans still due $6,300,740 00

There are now cash securities in the sinking fund for the payment of existing loans, being Nos. 9 to 16, inclusive, amounting to.. $3,681,376 51

And for the payment of the loan for the Southwark and Moyamensing, Germantown, Manayunk, and Richmond Gas Companies 209,246 72

3,890,623 23

Leaving balance of gas loans to be provided for..... $2,410,116 77

The interest on all outstanding loans is paid out of the annual surplus earnings of the works. Of the aggregate amount now in the various sinking funds, $3,590,623.23, is invested in securities bearing six per cent. interest and $300,000 in the new four per cent. city loans. The present amount of loans and cash in the sinking fund, is sufficient at the above rates of interest not only to pay off the principal of all the present outstanding loans, borrowed for the construction of the gas works, as they respectfully fall due, but to leave on January 1, 1905, when the last of the above loans become due, a surplus after their payment of $2,781,480.

This calculation does not credit the sinking funds with the two per cent. on the amount of outstanding loans, required by ordinance to be laid aside every year for the sinking funds, which will, of course, largely swell the above amount.

The sinking fund for the redemption of the loan created for the purchase of the Southwark and Moyamensing, Germantown, Manayunk, and Richmond Gas Companies' stock, to $300,740, is included in the foregoing statement; the amount of this special sinking fund is $209,246.72.

The net profits of the Works during the past year were $142,916.31, making the total amount of the accumulated profits up to the end of the year 1879, $3,331,434.15.

These results show that under the forty-five years' management of the City's Works, gas has been supplied to the citizens at a lower price than gas of a similar quality to any other city of equal size in the United States; while out of the surplus profits, contributed during this time altogether by private consumers, the works themselves have been constructed, in which there has been invested in actual cash over $11,000,000, and which, exclusive of the rise in value of the real estate on which they stand, represent an investment worth to-day considerably more than double their original cost. These works, which could not now be replaced for much less than $25,000,000, are subject to outstanding loans, all of which will be paid off by the year 1905 out of the accretions alone of the sinking funds now in hand, and leave a surplus of over $2,781,480.

The history of the enterprises for supplying gas to the different cities of the United States has long since shown that competition in its manufacture has only resulted in increasing the cost of gas to the consumer. It was pointed out by a former report that its manufacture differs from that of other commodities because its sale is confined to the district which the works supply. The gas manufacturer has also at first to invest an immense capital in gas mains and connections extending to the outskirts of the district which the works supply, and this expenditure is not repaid by the sale of gas for many years—in many cases never.

The Philadelphia Gas Works were commenced in 1835, on a smaller scale than would now be required for a village. The ordinance of March 21, 1835, incorporating a gas company in Philadelphia, provided for works on a scale competent to produce 75,000 cubic feet daily. The annual production of the first works was less than the amount of gas consumed on the three nights of the 21st, 22d, and 23d of December, 1879. In the following year $15,000 was borrowed to enlarge the works, to the payment of which the credit of the city was pledged. Two years afterward the consumption of gas had more than quadrupled, and a second loan of $200,000 was made. From this time until 1851, various loans, of comparatively small amount, were obtained for the extension and enlargement of the works, aggregating $1,370,000. During this interval the consumption of gas had become over thirty times as great as it was in 1836, the total number of private burners in the city in that year being less than 3000, while in 1851 there were 136,000. All the loans created up to that year (1851) have been since paid off, the eighth loan having been paid off on the 1st of January, 1872, and all out of the surplus profits realized up to that time (1872) from the sale of gas to private consumers.

Several independent private gas companies, prior to 1854, had been constructed in the old districts that now form the city, and which, after the consolidation in 1854, were purchased under ordinances of Councils by the Board of Trustees. In this way the works of the Spring Garden, Moyamensing, West Philadelphia, Frankford, and the Southwark and Moyamensing, the Germantown, the Manayunk, and the Richmond Companies, eight corporations in all, were purchased from time to time for $750,740, of which $450,000 has been since paid off, and at present all the works in the county, excepting those of the Northern Liberties, are operated by the Trust.

In addition to the first eight loans which, as already stated, were paid off out of the sale of gas to the citizens, there have also been invested in the works all the profits that have been realized from their management. From the time of the consolidation to 1861, all the surplus profits realized by the Trust, and $1,500,000 of loans besides, were applied to the enlargement of the gas works and the laying of additional mains for its distribution throughout the county. But in 1861 the extension of the city and the immense increase of consumption of gas, which had risen to over three times what it was in 1851, required the construction of entirely new works. The money already raised by loans Nos. 10 and 11, $1,000,000 in the aggregate, was used to construct new works at Point Breeze. In 1864 the increase of the city rendered it necessary to double these works, which now have a producing capacity of over 3,000,000 cubic feet of gas in twenty-four hours, and loan No. 12, of $1,000,000, was applied to this purpose.

At the time of the consolidation, the principal gas works were at Twenty-third and Market streets, and by continual additions to these works, the Trust continued to supply the central portion of the city with gas until

1871, when it became necessary to remove the older works and construct a gasometer there capable of containing 1,000,000 cubic feet of gas, together with a retort house of a capacity of 900 retorts. The present producing capacity of these works is 5,000,000 cubic feet of gas in twenty-four hours, which, owing to the want of space, is probably their extreme limit. In 1877 the continued steady growth of the city, in spite of the recent financial depression, again required the construction of new works, and two new gasometers, of a capacity of 1,000,000 cubic feet each, together with additional works, have been constructed in the Twenty-fifth Ward, at Tioga street on the Delaware, about three squares above the Richmond coal wharves. The mains from these works connect with the entire system of gas mains in the rest of the city. It is proposed to continue the extension of these works until they eventually have a producing capacity of 9,000,000 cubic feet daily. This is about the average daily consumption of the whole city, which, including leakage, is about 5,900,000 cubic feet a day, throughout the year. During the months of November, December, and January, however, the average consumption, including leakage, is much higher, amounting to 8,050,000 cubic feet daily. The present total producing capacity of the works is about 10,000,000 cubic feet daily, and the maximum consumption of gas in any twenty-four hours during the past year was 9,762,000 cubic feet, which was on the night of the 22d of December.

The cost of the various works, mains, and apparatus at present operated by the Trust is $11,245,288, the annual interest on which at six per cent. is $674,717. Had these works been constructed by a private corporation, this amount of annual interest on the investment would have to be first earned before any dividends could be declared among the corporators. To raise this amount at present, by the sale of gas, would require an additional payment of 51 cents per thousand feet by every private consumer, which, added to the rate of the past year, $2.15, would make $2.66 per thousand cubic feet.

The cost of construction of the Philadelphia Gas Works, however, has been defrayed from time to time out of their accumulated profits and from loans, for the payment of which sinking funds have been provided out of the sale of the gas itself. These sinking funds have been raised exclusively from the sale of gas to private consumers, who, when the existing loans are paid off, will have contributed the total cost of the gas works to the city.

The following table shows the amount of money at present invested in the works:

(1.) The first eight loans, all now paid off out of the accumulations of the profits of the works from 1836 to 1872		$1,370,000 00
(2.) Profits accumulated over and above the various sinking funds provided for the payment of loans		3,331,434 15
(3.) Total amount of sinking funds now on hand for the payment of existing loans, saved out of the surplus earnings from 1835 to 1880		3,890,623 23
Total amount invested in the works out of there earnings, from 1835 to 1880, a period of 45 years, contributed wholly by the private consumers of gas in the city of Philadelphia		$8,592,057 38
Additional amount now invested in the works, represented by outstanding loans, being loans Nos. 9 to 16, inclusive	$6,300,740 00	
Less the amount of sinking funds in hand January 1, 1880, for the payment of these loans	3,890,623 23	
		2,410,116 77
		$11,002,174 15

Which represents the actual investment in cash in the Philadelphia Gas Works up to the present time.

On about only one-fifth of the cost of this investment is any interest required to be defrayed by the consumer, namely, the amount of outstanding loans, less the sinking funds on hand for its payment, or on about $2,410,116.77. The remaining four-fifths of the cost of the investment is practically enjoyed by the citizens without charge for interest.

This represents an aggregate reduction in fixed charges of $516,000 per annum, which is equivalent to 39 cents per thousand feet.

Of the total amount of gas annually consumed, about one-fifth is supplied to the public lamps of the municipality. The total number of public lamps at present is 12,252.

Had the city paid the same price as the private consumer, and the same profit been realized from it as from citizens who use gas, it would have enabled the Trust to further reduce the price of gas to each consumer 32 cents per thousand feet below the present reduction, or to $1.68 per thousand cubic feet in the place of $2 for the coming year. This would have amounted to a reduction of over 21 per cent., or more than one-fifth, in the price of gas charged during the past year.

Allowing for the fact that the public light of the municipality is furnished for about one-third its actual cost, the price of gas now charged to the private consumer in Philadelphia is less than that of any city of considerable size in the country. The only cities were gas is supplied at a cheaper rate than in Philadelphia are those situated near the bituminous coal fields, such as Pittsburgh and Cincinnati, where the cost of gas coal is reduced almost to the price of labor required to dig it from the ground. In the city of Cincinnati, however, the charge to consumers is as high as $1.90 per thousand feet, while $1.60 is charged for the public lamps for gas of from 15½ to 16 candle power. The gas there is furnished to the municipality on substantially the same terms as to the ordinary citizen, as a somewhat smaller amount is required to defray the lighting and service of the public lamps than to examine and keep in order the individual meters, etc., of the citizens at large.

Were the gas furnished to the public lamps here on these terms, gas could, as above stated, be supplied to the citizens at $1.68 per thousand feet, or nearly 22 cents cheaper than in Cincinnati, which is situated as favorably as any city in the United States as regards its supply of coal.

In conclusion, the Board desire to express their acknowledgements to the executive officers of the Trust for the faithful manner in which they have discharged their respective duties.

By order of the Trustees.

ALBERT C. ROBERTS,
President.

Attest:
THOMAS NOBLE, *Registrar.*

ENGINEER'S REPORT.

To the Trustees of the Philadelphia Gas Works:

GENTLEMEN:—I have the honor to present the Forty-fifth Annual Report of the condition of the works, together with a detailed statement of the operations for the year 1879.

The total amount of gas made during the year was 2,180,625,000 cubic feet, it being an increase in quantity as compared with that made during the year 1878 of 13,086,000 cubic feet, making the total product of the works since their erection 30,640,468,000 cubic feet.

The amount manufactured at the different stations was as follows:

Gas made at the 26th Ward works	690,935,000	cubic ft.
Gas made at the 9th Ward works	908,384,000	"
Gas made at the 15th Ward works	181,602,000	"
Gas made at the 21st Ward works	33,054,000	"
Gas made at the 25th Ward works	366,650,000	"
	$2,180,625,000	"

The maximum consumption of gas in twenty-four hours was 9,762,000 cubic feet, which occurred on the night of the 22d of December.

The maximum production of gas in twenty-four hours was 8,892,000 cubic feet.

The annexed statement shows the quantity of materials used in the manufacture and purification of gas.

Statement.

	Tons of 2000 lbs.
Coal on hand January 1, 1879	48,809
Coal received in 1879	247,989
Total tons	296,798
Coal used in 1879	251,440
Coal sold in 1879	8
Coal on hand January 1, 1880	45,350
Total tons	296,798

Lime used in purification, 329,127 bushels.

	Bushels.
Coke on hand January 1, 1879	9,708
Coke made in 1879	6,863,988
Total bushels	6,873,696
Coke used under retorts in 1879	2,642,592
Coke used for boilers and lime kilns	318,483
Coke used in offices, yards, and streets	60,927
Coke sold in 1879	3,662,828
Coke breeze sold in 1879	111,938
Coke on hand January 1, 1880	76,928
Total bushels	6,873,696

The number of meters and service pipes introduced during the year ha been 1399.

Adding these to the total number before in use, makes the total number 96,828.

The applications for gas registered during the year have been 16,844.

Deducting removals and discontinuances, amounting to 15,447, shows an increase of 1,397, which, added to former number of consumers, makes the total number now on the books of the Trust 97,838.

The lights added during the year were.....	42,122
Previously in use.....	1,419,395
Total.....	1,461,517

There are now under the charge of the Trust 11,770 public lamps supplied with gas from these works, and 482 from the Northern Liberties Works, making a total of 12,252.

During the year 37,080 feet of street mains were laid, making the entire length of mains belonging to the Trust 3,719,381 feet, or 704¼ miles.

Owing to the insufficient supply of gas to the consumers in the upper portion of the Twenty-second Ward, as alluded to in last year's report by your late Chief Engineer, it was found necessary to lay an eight-inch main leading from the holder at Germantown along the line of Wister street, Chew street, and Gorgas lane to Main street, a distance of 13,571 feet, there connecting with the mains leading to Chestnut Hill, which has given entire satisfaction, and allayed all complaints from that locality.

A detailed statement of the operations of the works for the past and each preceding year will be found in the annexed tabular statement.

It affords me pleasure to state that the management of the officers in charge of the different departments of the works has been entirely satisfactory.

Yours respectfully,

WILLIAM K. PARK,
Chief Engineer.

We give above the published report of the President and Engineer of the Philadelphia Gas Trust as printed in their Annual Report, which contains, besides the above, detailed statements of the Cashier and the various expenditures of the Trust. For full particulars we would refer our readers to the pamphlet itself, which our space does not permit us to publish in full.

Dr. Adams on Units of Heat.

Mr. Bruce's critique on my method of testing the calorific force of a hot air gas stove merits my acknowledgements. We are thoroughly agreed, and it is only under some strange misapprehension—for I endeavored to make my meaning clear—that he thinks I consider his method of testing wrong. It is not absolutely accurate, because such are the difficulties that absolute accuracy is not practically attainable. But I know it to be based on the best scientific data, and I employ it when desirous of as extreme accuracy as the subject admits. It is not, however, suitable for ordinary use, because it can only be practiced with a knowledge of complicated rules, involving intricate and tedious calculations in decimal arithmetic, and with a provision at elbow of out-of-the-way books and tables of reference on every occasion. To avoid these drawbacks, and to enable individuals of ordinary information to obtain fairly approximate results for purposes of comparison, I have devised a very simple rule, easy to be practiced. Mr. Bruce admits its extreme simplicity and its strictly comparative accuracy so long as the initial temperatures of two stoves under observation are the same. But he shows that it contains a small element of error as soon as the initial temperatures differ. And to make this more readily apparent, he gives two illustrations, A and B, in the first of which 50 cubic feet of air are raised from a temperature of 32° F. to 132°, and in the second case 50 feet are raised from 52° to 152°, in both instances a rise of 100 degree. In both examples, my rule of multiplying the cubic feet of air by the degrees of temperature, and then deducting the initial temperature, gives a product of 5000, which I call units of heat. But one cubic foot of air at 32° weighs heavier than one cubic foot at 52°, and therefore requires more heat to raise the temperature of the heavier air through 100°. The ordinary, but very intricate rule determines this difference, and an addition to my own rule also determines this difference, which is thus specified and contrasted, Mr. Bruce very aptly stating that he reckons his units in pounds and I in pennies.

Ordinary units in A example.....	96.0
" " B "	92.3
Dr. Adams' units in A example	5000.0
" " B "	4807.2

The correction which I apply when using my own rule is by a simple calculation, which Mr. Bruce, no doubt, is quite well aware of. This correction reduces the 50 cubic feet of air at B to the volume they would occupy at a temperature of 32°, viz., 48.04. This correction I make before I multiply by the 100 degrees of temperature. But for ordinary use I do not complicate my simple rule by adding the mode of making this correction. The amount of error in this simple rule is so trifling—being less than four per cent.—even under the excessively strained corrections of a difference of 20 degrees of temperature in the two examples, that I prefer letting the error stand. When two stoves are compared with only a few degrees of difference in the initial heat, the amount or error by my rule is barely recognizable. And I feel gratified that Mr. Bruce's communication so strongly corroborates the practical utility of my single rule for dertermining all that it claims—*i. e.*, a fairly approximate estimate of values for purposes of comparison, and so I leave it.

While discussing this subject, it may be well, although somewhat of a repitition, that I should give the *ipsissima verba* used by me in my communication to the Philosophical Society. By so doing it will be already shown that I endeavored to make my meaning plain, and claimed no more than I now have done. The following is an extract from my paper:

"If I confined myself to a bald statement that so many units of heat are utilized in the combustion of so much gas, you would—at least many would—be little the wiser. To appraise the statement you must know the alleged value of the unit and have some standard or data for comparison. The ordinary English unit is that amount of heat which will raise the temperature of 1 lb. of water 1° Fahr. at 32° Fahr. But this standard is not conveniently applicable to the purpose of determining the calorific force of a gas stove. The specific heat of air, its weight per lb. at every degree of temperature, the quantity of moisture it contains, the material of which the stove is constructed, the shape in which it is fashioned, etc., etc., all form so many factors. And there is necessary such a variety of formulæ; and through all these is required so much of tables and other data close at elbow, and the arithmetical calculations are so intricate, tedious, and complicated, that very few individuals, although otherwise well informed, could follow the series of operations which go to the taking of a single test. So numerous are the fallacies to which the working of the rules are liable, that none of my chemist friends consider them practical for ordinary use. But they are all satisfied that the unit I adopt, although wanting in scientific accuracy, is nevertheless fair in determining approximate values, and for purposes of comparison.

"I take the temperature of the air *delivered*, and deduct from it the initial temperature. I measure (by the anemometer) the quantity of air that *enters* the stove to be warmed. I multiply the cubic feet of air by the degrees of temperature it has gained above the initial heat, and call the product units of heat.

"Thus, 1000 cubic feet of air, we will assume, enters the stove at 40° Fahr., and leaves it at 240° Fahr. Deducting the 40 degrees of initial heat, I multiply 1000 cubic feet of air by the 200 degrees of additional heat, which gives a product of 200,000. If the gas burned is, say, 5 cubic feet, I divide the product by 5, which gives a quotent of 40,000, and I say that one cubic foot of gas has yielded 40,000 units of heat.

The method is simple, easy to be practiced, and the results are sufficiently near the truth for all practical uses. But it is of great importance to determine how far the units of heat produce the desired result, for in this they may frequently fail for want of concentration and right direction. Reckoning the units of a main force, there were at Isandula some 1200 British utits and some 20,000 Zulu units, and the lesser number proved the most effective. Gunpowder has great potential force. A few grains will propel a pistol bullet through the panel of a door, but it will not open or close the door. A child of 3 years old will do both, but cannot force its hand through the panel. A tallow candle contains the potential force of many units of heat, but burned as a candle will not boil a kettle. *It is the manner in which a force is localized that gives the true measure of force in its relation to our present subject*, and I therefore place little value in a parade of units of heat, unless associated with a statement of the effect produced in the desired direction."—*Journal of Artificial Light.*

USE OF GAS ENGINES IN SCOTLAND.—Notwithstanding the extraordinary degree to which the public mind is absorbed with the elections which are now in progress, the leading Scotch newspaper has found space within the past few days to devote to an interesting and comprehensive article on "Gas Engines," a subject which is exciting a large amount of attention in Scotland. The article makes special reference to the gas engines which have been put up at the extensive new works at Parkside, Edinburgh, belonging to the eminent printing and publishing firm of Messrs. Thomas Nelson and Sons, one of them being about the most powerful of the kind yet constructed. I believe it is nominally an engine of 16-horse power.—London *Journal of Gas Lighting*, April 6.

THE RAILWAY SYSTEM of France was extended during the year 1879 by 618 kilometers, or 383 miles. This, of course, will be very considerably exceeded during this year, in which M. de Freycinet's plans begin to realize.

[From London "Journal of Gas Lighting."]

Experiments in Improved Street Lighting at Birmingham.

On Wednesday last, at the invitation of Mr. Charles Hunt, Engineer of the Birmingham Corporation Gas Department, a number of gas engineers, principally from the Midland Counties, and others interested in the subject of improved street lighting by means of gas, assembled at the Windsor Street works of the Corporation, for the purpose of viewing a collection of lanterns and burners of large power which had been got together by Mr. Hunt for the purposes of comparative trials of their efficiency. Among those who were present were Messrs. J. Annan, Wolverhampton; T. Arnold, Borough Surveyor's Office, Birmingham; J. C. Bent, Birmingham; G. Bray, Leeds; T. Collett, Dudley; W. Cross, Leamington; W. Davis, Hereford; J. Deakes, Worcester; A. Dougall, Kidderminster; H. Hack, Saltley; T. Jackson, Birmingham; Wm. King, Liverpool; T. Layton, Redditch; J. Mudie, Buston-on-Trent; W. North, Stourbridge; G. Parker, Oakengates; R. O. Paterson, Cheltenham; J. Peaty, Burslem; H. S. Pike, Hinckley; T. Proud, Birmingham; J. S. Reeves, Bilston; J. Reid, Derby; T. Roberts, Sheffield; P. Simpson, Rugby; S. Y. Shoubridge, Saltley; J. Slocombe, Birmingham; E. Smith, Secretary of the Corporation Gas Department; J. Storer, Stafford; W. Sugg, London; C. Taylor, Derby; J. Tindall, Walsall; W. Winstonley, Newcastle-under-Lyme; H. Woodall, Leeds; J. Wright, Birmingham, etc., etc.

The burners and lanterns were arranged in different parts of the works, the more important ones being placed at distances of about sixty yards from one another on a large tract of unoccupied land to be eventually used for extensions. By this means the effectiveness of the burners was easy of comparison, and much satisfaction was expressed at the completeness of the trials. Appended is a list of the burners and lanterns used, showing the consumption of gas by each burner, the illuminating power afforded (when tested in the photometer room) and the illuminating power obtained per foot of gas consumed.

After a long inspection of the various lanterns and burners, tests were made by a shadow meter between Suggs 200-candle Argand (No. 9) Bray's 200-candle Quadruple Batswing (No. 10), and the burner and lantern as used by the Paris Gas Company in the Rue du Quatre Septembe (No. 12), with the results shown on the diagram. These appear to agree pretty nearly with the photometrical results obtained from each burner, as shown in the preceding table.

On Thursday evening another trial was made between the burners Nos. 9 and 10 on the diagram. The consumption of gas in each was rated to exactly 46.75 feet per hour; and the lights were shown to be equal when the shadow meter was 73 ft. 2 in. from Bray's Quadruple Batswing, and 76 ft. 10 in. from Sugg's Argand.

It should here be mentioned that the Superintendent of the works, Mr. Alfred Colson, rendered very efficient service in conducting these tests; in fact, to his able assistance Mr. Hunt is considerably indebted for the success which has attended the experiments all through.

The lamp-columns adopted by the Gas Committee to be erected in various parts of the town, which have been specially designed and made for the Corporation by Messrs. Hart, Son, and Peard, of London and Birmingham, were much admired for their substantial yet ornamental and effective appearance.

At the close of the inspection refreshments were served, after which

Mr. Henry Woodall proposed a vote of thanks to Mr. Hunt for affording those present an opportunity of witnessing the interesting experiments that had been carried through so successfully, remarking on the careful and judicious arrangements that had been made for a fair and equitable comparison to be instituted between the various systems for public gas illumination now before the public.

Mr. R. O. Paterson seconded the proposal, which was carried by acclamation.

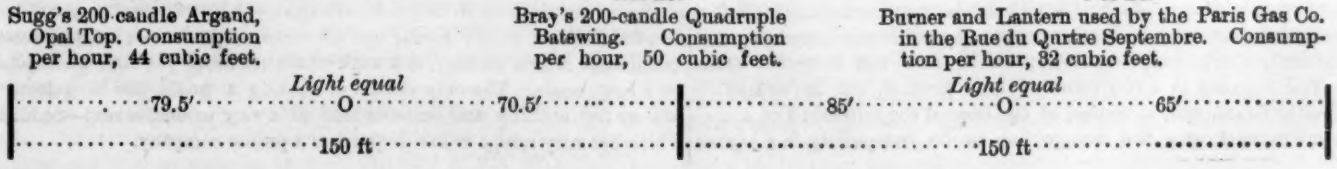
Mr. Hunt, in returning thanks, expressed the pleasure he felt at seeing so many present. It might, he said, be desirable that he should offer a word or two of explanation as to the circumstances under which the exhibition had been brought about. These experiments were initiated some fourteen months ago by the Chairman of the Gas Committee (Alderman Chamberlain, M. P.), who was desirous of showing in Birmingham what could be done with gas in the way of street lighting, as compared with electricity. His (Mr. Hunt's) instructions were comprehensive and, he might say, liberal. He was to procure not only the most suitable burner, but also a lantern capable of diffusing the light to the greatest possible extent, and, at the same time, one that should, with the column, contribute rather to the ornamentation of the street than otherwise. As they all knew, the question of the burner involved considerations apart from the illuminating power obtained; but his experience was that the proper form of lantern was a far more difficult matter. He might take this opportunity of acknowledging his obligation to the Gas Committee for the indulgence they had shown him with regard to the length of time the experiments had taken. It was not contemplated by anyone that they would last so long; but he felt, with the Committee, that they should, as far as possible under the circumstances, impress the character of permanence upon their work. How far they had succeeded in their aims was seen that night; but their experiments, at all events, proved one thing—that gas could hold its own for effectiveness with the electric or any other light.

The London *Metropolitan* comments as follows upon the results given below:

It would certainly appear from these figures that Mr. Sugg comes off first. We are informed that the tests of the 200 candle burners of the two manu-

No. of Lamp.	Description of Burner.	Description of Lantern.	Consumption of Gas. Cubic Feet per Hour.	Illuminating Power, Tested with 17 Candle Gas.	Illuminating Power per Foot.	Remarks.
				Candles.		
1	Batswing.....	Kitt's fitted with reflector.....	2.5 each	4.62* each	1.85	In direct line with reflectors, 54.4 candles.
2	"	Collin's patent "	6.0 burn'r	16.90* "	2.80	
3	"	Ordinary street.....	5.0	14.00 "	2.80	
4	Sugg's 80 candle Argand.....	Sugg's Shadowless	22.8	74.55 "	3.26	
5	Bray's 60 " Trip. Batswing	3 Frosted globes, 24 in. diameter	26.4 each	85.00 "	3.21	These globes diminish the light by 35 p. ct.
6	" 60 " " "	3 Clear " " "	24.0 globe.	73.00 "	3.04	
7	Sugg's 100 " Argand.....	3 Opal top " 30 in. "	27.0	101.70 "	3.77	
8	" 80 " "	1 " " 26 in. "	23.4	79.87 "	3.41	
9	" 200 " "	1 " "	45.6	180.20 "	3.95	
10	Bray's 200 " Quad Batswing.	Bray's shadowless.....	44.4	134.40 "	3.02	
11	" 60 " Triple Batswing.	" "	21.6	63.00 "	2.92	
12	Burner and lantern used by the Rue du Quatre Septembre...	the Paris Gas Company in the	48.0	139.40 "	2.90	
13	Gaudet's, Paris.....	Gaudet's.....	52.8	158.10 "	2.99	
14	Mallet's "	Mallet's.....	43.0	141.10 "	3.28	
15	Wigham's.....	Wigham's	60.0	150.00 "	2.50	
16	Sugg's 200-candle, hollow top flat flame	Sugg's octagon.....	66.0	201.00 "	3.04†	
17	Sugg's 100-candle Argand.....	Sugg's octagon, new pattern.....	30.60	96.15 "	3.14	
18	Bray's Quadruple.....	24 inch circular.....	Were erected too recently to be tested			
19	" 400-candle.....	Bray's.....				

*Without reflector. †A better result—viz., 3.24—was obtained with a consumption of 45 cubic feet of gas per hour.



factures were especially exhaustive, and that the result was decidedly in favor of the Vincent street works. Of course, no one is better aware than ourselves that in the selection of a burner and lantern for street lighting purposes, regard must be had to a variety of circumstances quite distinct from those taken into consideration for the purposes of these experiments, and we are bound to confess that there are not a few who are under the impression that, all other things being fairly equal, flat flame burners are those most suitable for the lighting of our public streets; but when a direct issue is raised as to the precise amount of light yielded by two burners of this character in proportion to the quantity of gas consumed, it is important, if only for the information of those who have charge of our public lighting, that the merits of the two inventions in this respect should be approximately ascertained.

[From "Engineer."]

The Disposal of Sewage.

For some time past little had been heard concerning the disposal of sewage. Those who at one time wrote, spoke, and lectured most earnestly on the subject, seem to have entered upon other pursuits. They have apparently abandoned their old love in favor of something new, or else they have lapsed into a condition of apathy, possibly sullen, possibly not unpleasant. There is but one way of explaining this silence. The necessity for disposing of sewage is as pressing now as it was at any time within the last dozen years, and the reason why enthusiastic projectors no longer write to the daily press, or publish books on the subject, is that all their prognostications, almost without exception, have been falsified, while their anticipations have ended in nothing save disappointment. At one time it was fiercely maintained that the sewage of each individual possessed a money value of about 8s. per annum. It is not impossible that men may still be found who hold that the sewage of London might be made worth £1,500,000 a year. In order to impart this value to it, it would be necessary to avoid the use of water as a carrying agent; in a word to adopt what is technically called the dry system. The concession that water-borne sewage was not worth 8s. per head per annum was wrung from a considerable party only after the lapse of a long period, and by the hard logic of facts. It is now, however, generally admitted that the money value of sewage is much less than it should be according to chemists. But it is still held to possess considerable value, and we now and then have this proposition urged on our attention. Mr Mechi, for example, not long since endeavored to turn men's minds once more to the utilization of sewage. It is rumored that the moment commercial prosperity has been sufficiently restored, more than one company will be floated with the object of making a profit out of sewage. It is not improbable, indeed, that the lull in what we may term sewage agitation is nearly at an end; and this being the case it is worth while to call attention once more to some truths which, however they may be glossed over or distorted by enthusiasts, have certainly never been refuted.

To dispose of sewage at a profit has been tried over and over again with the utmost persistency, and at an enormous cost. The result has been complete failure. In certain isolated cases, where the quantity to be dealt with has been small, or where the conditions have been exceptionally favorable, a small profit has been made either by individuals, companies, or towns; but all attempts to get rid of the sewage of cities, and to realize for those cities even a moderate profit on the cost of the necessary works as well, have been failures. There are two ways in which sewage can be delivered on land. It can be supplied to the agriculturist either in the fluid or the solid form. Even the most warm advocates of irrigation now admit, what we years ago maintained, namely, that fluid sewage possesses very little more value than plain water. In other words, the dry hungry soils, on which fluid sewage has heretofore been used to most advantage, could be made to produce very nearly as good crops if irrigated from a river or spring instead of with the sewage of a town. Granting this, however, the fact remains that very good crops can be grown on land irrigated either with water or sewage and the sewage, consequently, does possess a money value. Solid manure made from sewage is of various values. It has been sold at all prices, from 10s. to £3 per ton; as a rule it is worth probably about £1 10s. per ton. It will be seen, therefore, that those who most earnestly advocate the utilization of sewage have something to go on; unfortunately, for them and for others, they have not enough. The causes of the failure of sewage schemes are very few and very simple. They lie in the difficulty met with in obtaining land adapted for the application of sewage; and the cost of delivery. The first-mentioned obstacle is one of overwhelming magnitude, conflicting interests warring with each other and with sanitary authorities. To find a suitable site for a sewage farm is often a work of great trouble, and the sum demanded for it is invariably very large; nor is there any help for these things. Towns do not as a rule stand on high ground, but in valleys or places close to rivers, and, of course, at the base of the watershed of a district Thus in most cases the sewage has to be pumped up to a higher level than the town, that it may gravitate to the farm. And so it happens that by the time the farm has been obtained, and the necessary machinery has been put down for pumping, a mighty sum has been expended. In a few cases the sewage can be made to grow crops enough to pay the cost of pumping; but there is no known instance of a really large town obtaining in this way a return great enough to pay the cost of pumping, and a fair percentage on the capital invested besides. No doubt mistakes have in many instances been made in the selection of sites, and the design of machinery; but with all allowances the fact cannot be argued away—that no example can be cited of a large town pumping its sewage on to a farm and making an adequate profit on the outlay. We believe that Mr. Bailey Denton has succeeded in obtaining a satisfactory result in a few cases on a small scale; but with small scale operations we are not now dealing. It is not possible to see how any change for the better can be made in this respect, and we fancy we do not go too far when we say that even the warmest advocates of sewage irrigation now admit that it is impossible to buy or rent a farm and pump sewage on to it at a profit. In a few instances towns have been able to sell their sewage at so much per thousand gallons to farmers, and under these conditions the loss has been small, while in others a trifling profit has been made; but on analysis it will be seen that the result has been brought about because the town has only had to pay for pumping and the interest on the cost of the works, and has not been embarrassed at all about land. In other words, if farms could be had gratis on which to spread sewage, the whole aspect of the matter would be changed for the better, and sewage irrigation might be practiced at a good profit. As there is no more chance of this than there is that the sky will fall, we are justified in maintaining that from the application of fluid sewage to land, towns and cities have nothing to hope in the way of emolument.

As regards the dispesal of sewage in the solid form matters do not look much more hopeful. Although the pail system can be, and has been, used successfully to some extent in certain districts of a few cities and towns, it is totally opposed to the instincts of a very numerous, powerful, and refined class who will not have it at any price. Those who undertake to dispose of sewage in the solid form must therefore count upon having to deal with it in the fluid form at some time. This has been the ruin of all manner of schemes. Sewage to be worth £2 a ton must be, comparatively speaking, quite dry. Now, it is an easy matter enough to throw down the solid constituents of towns sewage. Settling tanks of sufficient size, and a little lime, or lime and clay properly used, will soon bring about the desired result. The supernatant water can be drawn off as clarified sewage and poured into a river without fear of the consequences. But what is to be done with the enormous mass of foul mud left behind? The really valuable part of the deposit—the ammonia—does not amount to one ton in a hundred, perhaps not to one ton in a thousand. The greater portion of the mud comes from the attrition of the streets. To get the ammonia on to the land it must be taken there in company with the street sweeping, sand, and gravel, of no possible value as fertilizers. The water has to be driven away from all this mass of mud, and this can only be done at a cost which raises the value of every ton of the manure far above the price which the farmer can afford to pay for it. The bankruptcy of company after company which has attempted to make a saleable dry manure from sewage demonstrates the accuracy of our statements.

To sum up, the manurial value of sewage has been very much over-estimated. The cost of obtaining such valuable constituents as it really does possess in an approximately concentrated form is much too great to enable a profit to be made. Attempts to extract the equivalent of a very inferior guano from sewage find a parallel in the struggle to get a profit out of the crushing and amalgamation of a poor gold-bearing quartz. The rock does not contain gold enough to pay for the labor spent in getting it out. In like manner, sewage does not contain ammonia enough to pay for the cost of getting it in a portable form. Our readers will do well, under the circumstances, to look with the utmost caution at the shares of all companies proposing to make a profit out of the utilization of sewage. We do not assert that it will always be impossible to get an adequate return for money spent on such schemes; but we do assert that it is impossible at present, and under existing conditions. Circumstances may be met with now and then which alter the aspect of the question. For instance, pumping may not be necessary, and land may be had for next to nothing. Then with good management, it is quite probable that a profit may be made on a moderate outlay. Again, the dry system may be in use, and as the cost of getting rid of water is avoided, a profit may be made by converting the contents of pails into *poudrette*. But these are all exceptions to the rule, and any person or company undertaking to deal with sewage must be prepared to get it in the but too familiar liquid form; and to make a profit out of this sewage, manipulate it how we may, is a work which has never yet been accomplished on a large scale. The only chance of making a profit lies in getting the sewage for nothing and suitable land at a very moderate rent—conditions which are very rarely at the disposal of a public company.

American Society of Civil Engineers.

The Twelfth Annual Convention of the Society will be held at St. Louis, Mo., beginning Tuesday, May 25th, 1880.

Sessions for the consideration of professional subjects, and one for the transaction of business will be held.

The details of the programme will be announced as soon as determined by the local committee.

The following is a list of topics to be considered with reference to papers published in Transactions during the preceding year:

CLXXV. (*Jan.* 1879) The Flow of Water in small Channels, after Ganguillet and Kutter, with Kutter's Diagram modified, and Graphical Tables with special reference to Sewer Calculations.—R. Hering.

CLXXVI. (*Jan.*) The permanent Way of Railways in Great Britain and Ireland, with especial reference to the use of Timber, Preserved and Unpreserved, Compiled from information received from Engineers in charge of those Railways.—John Bogart.

CLXXVII. (*Feb.*) Experiments on the Resistances of Rolling Stock. Made under the direction of Charles Paine.—A. M. Wellington.

CLXXVIII. (*March.*) Light-houss Engineering as displayed at the Centennial Exhibition.—John G. Barnard.

CLXXIX. (*April.*) Minot's Ledge Light house.—B. S. Alexander.

CLXXX. (*May.*) The Construction and Maintenance of Roads.—Edward P. North.

CLXXXI. (*June.*) Flexure and Transverse Resistance of Beams.—Charles E. Emery.

CLXXXII. (*July.*) On the Flow of Water in Rivers.—De Volson Wood.

CLXXXIII. (*Aug.*) The South Pass Jetties. Notes on the Consolidation and Durability of the Works, with a description of the Concrete Blocks and other Constructions of the last year.—Max E. Schmidt.

CLXXXIV. (*Sept.*) The Ocean Pier at Coney Island.—Charles Macdonald.

CLXXXV. (*Sept.*) Stability of Stone Structures.—William E. Searles.

CLXXXVI. (*October.*) The Use of Steel for Bridges.—Theodore Cooper.

CLXXXVII. (*Oct.*) The Construction of the Atchison, Topeka and Santa Fe railroad over the Raton Mountains, and the Performance of Locomotives on its Steep Grades.—James D. Burr.

CLXXXVIII. (*Nov.*) Inter-Oceanic Canal Projects.—A. G. Menocal.

January, February, March, 1880.—Inter-Oceanic Canal Projects, by Walton W. Evans, Frederick M. Kelley, Charles A. Sweet, John C. Campbell, Charles D. Ward, Nathan Appleton, S. F. Shelbourne, Max E. Schmidt, Thomas J. Long, Edward P. North, Ashbel Welch, Julius W. Adams, F. de Lesseps, J. Dirks, V. Dauzats.

Also papers in continuation of the discussion on Inter-Oceanic Canal Projects, by A. Couvreux *fils*, Charles Macdonald, T. C. Clarke, and others, will be printed before the date of the Convention.

CLXXXIX. (*March.*) Engineering Problems Involved in the Proposed Improvement of the Erie Canal, by increasing the Depth of its Channel one Foot. By E. Sweet, Jr.

The following papers also will be printed and ready for distribution before the time of the Convention.

Note on Kutter's Diagram. By Charles H. Swan.

The New York and Brooklyn Bridge Approaches and Superstructure. By F. Collingwood.

Experiments with Apparatus for Testing Cements, by Alfred Noble, with discussion on testing cement, by F. Collingwood, D. W. Cunningham, C. Latimer, F. O. Norton, F. Rinecker, W. Sooy Smith, D. J. Whittemore.

Design and Construction Table for Egg-Shaped Sewers. By C. G. Force.

The Preservation of Timber. By J. W. Putnam.

On the Variation due to Orthogonal Strains in the Elastic Limit in Metals, and on its Practical Value and more important applications. By R. H. Thurston.

Members of the Society are earnestly requested to furnish information or memoranda upon any of the subjects referred to. They are also invited and expected to take part in the discussions, either in person or by sending to the Secretary notes for presentation. In either case it will assist the Committee in arranging the details for sessions of the Convention, if members expecting to take part in the discussions will notify the Secretary at once to that effect.

Excursions by river and by rail from St. Louis are contemplated, and the arrangements for them are in progress. The Secretary is instructed to state that it is permissible that members of the Society should be accompanied by their families.

Under the rule adopted by the Society in reference to invitations to Conventions, the members of other engineering organizations, also the editors of professional journals exchanging with this Society will be invited to attend the Convention and the excursions connected therewith.

The details of the arrangements are now being perfected, and will soon be announced.

You are invited to attend the Convention and take part in the discussions and excursions.

Please notify the Secretary whether you will attend, and whether you will present a paper or take part in the special discussions,

T. J. Whitman,
Secretary Local Committee, St. Louis.

104 East 20th Street,
New York, April 7th, 1880.

John Bogart,
Secretary, A. S. C. E.

The Prospects of the Electric Light.

By A Practical Student.

It is possible that timid proprietors of gas shares may peruse this article with somewhat similar feelings to those they might be expected to experience when reading of the advancement of an invading enemy; but these are few. The majority will not feel disturbed, having comforted themselves by the reflection that no instance of an industry of such gigantic proportions as that of coal gas manufacture and supply being improved off the face of the earth with such suddenness as to involve the loss of the capital engaged in it, and the consequent ruin of those who had invested there all therein, has ever been known. Others, of a more business-like turn of mind, have ascertained that no form of the electric light in practical use can compete with coal gas in the field of ordinary private consumption, which produces the bulk of the revenues of the gas companies, and nearly all their profit; whilst those of a desponding turn of mind have been able to derive some consolation from the facts that years have elapsed before the British householder was persuaded to introduce gas into the bosom of his family (for 30 or 40 years after its introduction its use was confined to shops, buildings, and streets), and therefore very great advantages must be offered to that not over-sanguine individual, before he will be induced to incur the expenses of lamps, copper wires, insulators, etc.; and that, in spite of the general introduction of gas, as there is still a good demand for candles, so gas will remain a public requirement for very many years to come, notwithstanding the introduction of electric or other improved systems of artificial illumination.

We have certainly had a very brilliant light produced by electricity; but very much remains to be done before this system of illumination is fit for anything like general use, or to compete with the other systems now in vogue. The only form of electric light that has at present attained any degree of practical success is that in which the light is produced between pieces, commonly called pencils, of carbon, which gradually vaporize, rendering frequent replenishment necessary. The constant attention required will probably outweigh, in public opinion, any possible advantages attainable from this form of the light. As to the light itself, it is apt to be unsteady, and the hissing, spluttering, frizzling, and spitting, now apparently its inseparable accompaniments, will also require to be remedied; but these defects are only trifling in comparison with the practical difficulties in the way of subdividing and distributing the ethereal force, and of insuring a constant supply, as is now done in the case of coal gas. These difficulties are so insuperable that we may regard the use of this system of electric lighting as practically confined to large spaces, advertising purposes, etc., where expense is not an important consideration.

Anent this subject, some months ago (*Gas Trade Review*, vol. v., p. 345) the present writer remarked as follows:

"My own impression is that neither ignited carbon points, or incandescent metals, will ever come into practical use as electric lamps; but that if such a thing ever does come to pass, it will be something in the form of the glow produced by an electric current through a rarefied gaseous medium, as in the apparatus known as 'Geisler's Tubes.'"

Subsequent experience appears to favor this view. Since the words were printed, Mr. W. Crookes, F.C.S., has exhibited before the Royal Society some wonderful experiments in illustration of his researches respecting "radiant matter," in the course of which, by exposing certain substances to the action "of an electric current through a rarefied gaseous medium," he produced a degree of radiant light equal in intensity to three candles; and it is said that Mr. Crookes has turned his attention in this direction with a success that appears to warrant further expectation, and certainly, in theory, it seems that this is the most economical method of utilizing electric forces for the purposes of artificial illumination.

It is possible that these experiments of Mr. Crookes may have suggested to the "modern Aladdin" of Menlo Park, U.S.A., the ideas which have recently culminated in the "discoveries" embodied in the "shilling electric lamp," which, according to accounts, is certainly four, and possibly forty times cheaper than gas. This remarkable genius resembles his prototype of fiction, not only in the possession of a wonderful lamp, but also, judging from his frequent innovations, in having no objection to "change old lamps for new ones."—*Review of Gas and Water Engineering.*

[From the London "Journal of Gas Lighting." March 16.]

Public Lighting in London and Paris.

Lieut.-Col. Haywood, Engineer and Surveyor to the Commissioners of Sewers of the city of London, in his report for 1879 says, in reference to street lighting, that tenders were received from the Chartered Gas Company for lighting the public lamps, at £4 13s. 3d. per annum for square-shaped lamps consuming 5 feet of gas an hour, and £4 17s. 6d. for those of a circular shape; the difference in the cost of the two being in consequence of the additional expense of cleaning and maintaining the latter lanterns. These prices were the same as those paid since 1877. The meters attached to 36 of the public lamps in various parts of the city showed that the full contract quantity of gas was there given; and the Inspector of Pavements and the Inspector of Gas Lighting were of opinion that the full contract quantity of gas was given at all the lamps, and that the regulators were kept in proper condition by the Company.

As to the experiments with improved gas lanterns and burners in Queen Victoria Street, Mr. Haywood states that from information and data supplied by the Chartered Gas Company, the general result appeared to be that the improved system of lighting (which was discontinued at the end of last year) gave about four and a half times as much light as the ordinary system, at about three times the cost; but the Commissioners came to no resolution respecting the value of the experiment.

In regard to the electric lighting of the Holborn Viaduct, which was terminated on the 9th of March last year, the report says that the 16 lamps employed in a length of 473 yards—an area of 14,200 superficial yards—of roadway was £5 per night, or 6s. 3d. per lamp. No photometrical observations of the light were made; but, from figures given in the report to the Metropolitan Board of Works upon the electric light on the Thames Embankment, it might be reckoned that the lamps on the Viaduct gave, when uninclosed, about five times the light of ordinary gas lamps, and when inclosed in opal globes (as they were when in use), twice as much only, and that the actual cost was nearly four times that of gas.

In reference to a paragraph which recently appeared in *Galignani's Messenger*, and which has been copied into and misled some of the English and Scotch papers, to the effect that the electric light was to have been discontinued in Paris in the end of last month, we learn that such is not the case. At the meeting of the Municipal Council on the 26th ult., a report was presented by M. Cernesson, on behalf of the Third (Streets and Lighting) Committee, recommending the continuance of the light for another twelve months; and at the same time suggesting the curtailment of the improved system of gas lighting at present in use in the Rue du Qurtre Septembre. The following is a translation of portions of the report, which was adopted:

"Taking into consideration the fact that the electric light is paid for according to the amount of light furnished, and that the value of that light is estimated by taking as a basis the actual price of gas—in other words, the price of the cheapest kind of light—the majority of the Committee are of opinion that the electric lighting might be continued in the Avenue de l'Opera, and in each of the two Places in which it terminates, for the period of one year (that is to say, until March 1, 1881) on the existing terms, viz., at the price of 30c. per burner per hour, the Jablochkoff Electric Light Company undertaking, as previously, to bear the expense of lighting and extinguishing.

"The Committee think that one-half the burners in the Rue du Quatre Septembre might be dispensed with, and probably also their consumption reduced. They, however, ask the Council to allow them to further consider this matter in conjunction with the Administration, and they will shortly make known their proposals."

Four Men Nearly Perish from Escaping Gas in Brooklyn at the Fulton Municipal Gas Company's Works.

At three o'clock yesterday afternoon (April 17th, 1880), two men were nearly suffocated by escaping gas in the governor-house of the Fulton Municipal Gas Company, on the corner of Degraw and Nevins streets. That they were not was due to the prompt assistance of men in the retort-house, and the decisive action of Mr. G. O. Knapp, the assistant engineer of the works. The governor-house is an octagonal brick building immediately adjoining the two immense gas holders, and in the cellar of the governor house the mains all meet. It is here that the gas can be turned on or off in any part of the city where it may be supplied, and also where the pressure is regulated. Every foot of gas made in the works passes through these mains from the purifying house to the holders, and thence from the holders to the consumers. The new company commenced to make gas on Monday April 12th, but so far have had occasion to use one holder only. This holder was about three-quarters full yesterday afternoon when the accident occurred. It had been found necessary by the contractor for the iron work, Mr. T. F. Rowland, to make a change in the cellar of the governor-house, which, as may be imagined, contains nothing but a labyrinth of immense pipes and valves. A new joint was wanted on what is known as a hand hole plate on one of the mains, and Mr. Rowland's foreman went into the governor-house with two men to make it. The foreman showed his workmen what was to be done and then left them to attend to the job. Neither the foreman nor his men are gas men, but Mr. J. B. Chichester, who is the engineer of the gas works, told the foreman how to shut off the gas in the main where he had to work. All that the foreman had to do was to turn a valve and let the water flow into the pipe. This he neglected to do for some unexplained reason, and the result was that as soon as the hand hole plate was sufficiently loosened the gas rushed out in a dense volume, and filled the apartment. At this particular time there was but one workman in the cellar. This was Peter Quinn, who resides in Fourteenth street. As soon as the gas rushed out he was so suffocated that he could not cry out. His lungs were so surcharged before he had the power to give the slightest alarm, and had it not been for the presence of Michael Bullock on the floor above, who at once heard the noise of the gas rushing out, the chances are that Quinn would have been dead before help could have been given at all. Bullock, who resides in New York, shouted to the men who were outside the governor-house and ran down the narrow stairs to help Quinn, whom he saw lying apparently lifeless on the cemented floor of the cellar. Three or four laborers ran into the house, and another went to the office at the works, and alarmed Mr. Knapp, the assistant engineer. He ran to the governor-house, and found that not only Quinn was down below, but Bullock, who had gone to his rescue, was down there too, he having been overcome. All this time the gas was rushing out of the holder at a fearful rate, there being 250,000 feet in it at the time. The four laborers who had gone to the rescue of the men went down to the cellar and succeeded in getting Bullock up, but before they could save Quinn they became

HALF SUFFOCATED AND FRIGTENED.

They had dragged Quinn half way up stairs and then become so nauseated and affected by the gas that they let him drop to the bottom, and in falling he bruised his head considerably. Mr. Knapp saw that the men were frightened, and knew that Quinn would die unless some help was got at once. He rushed from the governor house, across the works, between Nevins street and Third avenue, to the other portion of the works, between Nevins street and the canal. Selecting a couple of men from the retort-house, he hurried them back with him, and telling them not to lose their nerve, but to follow him, he led the way down to the governor house cellar, from which the gas was issuing and tainting the air for blocks around. The men followed him faithfully, they got hold of Quinn, and all three dragged him bodily to the upper floor. Then he was carried by other men to the office of the works, while Mr. Knapp and the two men, who were almost overcome, were taken to fresh air and had restoratives administered to them.

THEY WERE ALL MORE OR LESS AFFECTED.

The ambulance was telegraphed for, and messengers sent for physicians. Bullock was carried to an upper floor in the office and placed on a bed, while Quinn was stretched out in a convenient place to give him all the air possible. The first physician to arrive at the works was Dr. J. P. Van Horne, of Dean and Nevins streets. Shortly after the ambulance arrived with surgeon Connery. The two doctors set to work at their patients; remedies were administered, and in an hour after the accident, both had recovered consciousness. They had been deathly sick, and had a narrow escape of it, but both Dr. Van Horne and the ambulance surgeon stated that they would recover. Bullock was allowed to remain upon the bed in the office, and Quinn was removed to the hospital. He was the the worse of the two, but his condition is a hopeful one. In the meantime, the most absurd rumors had been set afloat in the immediate vicinity of the works. It was stated that six men had been smothered, and that several others were in a fair way of dying. The result was that an excited crowd gathered about the works, but Captain MacKellar arrived there with Detective Lenehan, and about a dozen policeman, who succeeded in preserving order. The entire affair was due to the carelessness of the foreman of contractor Rowland's men, who failed to shut off the gas, as he had been told to do. The gas company are perfectly blameless in the transaction. All that they have to do is to pay the doctors' bill and pocket the loss sustained by the escaping of about two hundred and fifty thousand feet of gas.—*Brooklyn Daily Eagle.*

A TEN YEAR CONTRACT with the Cincinnati, Ohio, Gas Light Company, for gas at $1.60 a thousand, has been made by the city. Mayor Jacob signed the ordinance on Feb. 24th. The *Commercial* thinks it is too much, but it was feared that the question might be brought into the courts by the company were the price put lower.—*Sanitary Engineer.*

Electric Lighting.

The Metropolitan Board of Works has just renewed for one year the contract with the Société Générale d'Electricitè for lighting the Thames Embankment and Waterloo Bridge by means of the Jablochkoff system of electric lighting. The new contract will expire on the 10th of April, 1881.

In view of this circumstance it may be interesting to note briefly the gradual extension of the system, especially as regards its application to public lighting on the Embankment. It may be remembered that the first arrangement was made in October, 1878, by the Metropolitan Board, when they contracted with the Société Générale for lighting, by means of 20 lights, that portion of the Embankment lying between Westminster and Waterloo Bridges. The first public illumination was on the evening of the 13th of December in that year. On the 10th of May, 1879, the lighting of the Embankment was extended eastward from Waterloo Bridge to that of Blackfriars, 20 lights being added to the 20 already working. A further extension to the system was effected on the 10th of October, 1879, when 10 more lights were placed on Waterloo Bridge, thus bringing the total number of public lights in that locality to 50.

Since the dates mentioned above—that is, for 15 months for the first series of 20 lights, 10½ months for the second series of 20, and 5½ months for the last series of ten—the whole of the lights have been kept uninterruptedly burning every night, Sundays included, for their alloted time of six hours according to the contract These are facts worthy of consideration when it is remembered that the plant and machinery were originally laid down for 20 lights only. The subsequent extensions not having been contemplated at the time, no provision whatever was made for them. This has necessitated considerable alterations to the plant each time the additions were made, and those in charge had to do the best they could under the circumstances to meet the case. It is also to be borne in mind that 10 more lights were subsequently obtained from the existing plant, making 60 altogether, the last 10 being those which illuminate the Victoria Station of the Metropolitan District Railway. Since the first contract was entered into, the prices paid by the Board have been considerably reduced. In the first instance the price paid was 6d. per light per hour. Upon the Board increasing the number of lights to 40, the price was reduced to 5d. per light per hour; a further reduction to 3d. being made when the number was increased to 50, and the contract renewed for six months. The lighting is now to be carried out for 2½d. per light per hour, the contract having been extended to one year.

The Jablochkoff system of electric lighting is now in operation not only in public thoroughfares, but in a great variety of works and private establishments as well as in those of public resort. It is also in use in the palace of King Thebaw, of Burmah, at Mandalay, where there are 60 lights, and in the palace of Shah Nasser ed Deen, of Persia, at Teheran, where there are four lights. Prince Agaklan has six in his palace at Bombay, and King Dom Luis I. of Portugal, six in his Royal Palace of Casenëo. Queen Isabella of Spain has also six in the conservatory of her residence in Paris. The Paris Municipal Council has renewed for one year the contract for lighting the Avenue de l'Opéra, and Place du Théatre Frangais, and the Sous-Secrétaire d'Etat, at the Ministere des Beaux Arts, has authorised the lighting of the *Salon* at the Palais de l'Industrie in June next on the Jablochkoff system. Altogether the application of this system is quietly extending, and the Metropolitan Board of Works deserve every credit for the part they have taken in developing the question of electric lighting in London.—*Journal of the Society of Arts.*

Gas Commission.

[Abstract from Official Report, City Record.]

LIGHTING PUBLIC LAMPS.

The officers designated by section 1 of chapter 478, of the Laws of 1879, met in the office of the Commissioner of Public Works, at 1 o'clock P.M., on Saturday, March 13, 1880.

The minutes of the meeting of December 15, 1879, were read and approved.

The Commissioner of Public Works stated that the contracts for lighting the public lamps made with the New York, Manhattan, Mutual, Metropolitan, Harlem, and Yonkers Gas Light Companies would expire on the 30th of April next, and it was necessary that proposals be invited for furnishing the gas to and lighting, etc., the public lamps for the year commencing May 1, 1880, and ending April 30, 1881.

The Commissioner of Public Works then presented a form of specifications and contract for furnishing the gas or other illuminating material for and lighting, extinguishing, cleaning, repairing, and maintaining the public lamps on the streets, avenues, piers, parks and places in the City of New York, excepting the Twenty-third Ward, and that portion of the Twenty-fourth Ward, formerly known as the Town of West Farms, for the period of one year, commencing May 1, 1880, and ending April 30, 1881, and he moved that the same be approved.

The Chairman put the question upon agreeing with the motion, and the same was adopted.

The Commissioner of Public Works then moved that Friday, March 26, 1880, at 12 o'clock M., be designated as the time for opening proposals for the same.

The Chairman put the question upon agreeing with said motion, and it was decided in the affirmative.

Adjourned.

SATURDAY, March 27, 1880.

The Gas Commission met in the office of the Commissioner of Public Works at 1 o'clock P.M., Saturday, March 27, 1880.

All were present.

The minutes of the meeting of March 13, 1880, were read and approved.

The Secretary stated that the box for the reception of the proposals for furnishing the gas to and lighting the public lamps was closed and sealed at 12 o'clock M., on Friday, March 26, 1870, and that he had announced that the opening of the proposals had been postponed until 1 o'clock P.M., Saturday, March 27, 1880.

The box containing the proposals was then opened and eight bids were found therein, and publicly read, (as published on p. 151, April 2d).

TUESDAY, March 30, 1880.

The Gas Commission met in the office of the Commissioner of Public Works, at 12:15 P.M., Tuesday, March 30, 1880.

All were present.

The minutes of the meeting of March 26, 1880, were read and approved.

The Commissioner of Public Works presented the following report from the Secretary:

Hon. Allan Campbell, Commissioner of Public Works:

Sir—In the matter of several proposals for furnishing the gas to, and lighting the public lamps. which were opened by the Gas Commission on the 27th inst., I have to report as follows:

[The report then gives the details of the bids as in the table above referred to].

The total gross amount required to light and maintain the foregoing 21,367 lamps for eight months ending December 31, next, at the lowess bids, is	$245,390 78
The total amount of the appropriation for lamps and gas available for the foregoing purposes is	225,972 70
Showing a deficiency of	19,418 08

The number of lamps shown in the foregoing statement is the actual number which will be lighted on the first day of May next, the commencement of the term; and no allowance has been made for the new lamps which have been and will be ordered to be erected by the Common Council during the year. In the Twelfth, Nineteenth, and Twenty-second wards, many new buildings are now being erected, and no doubt the erection of many others will be commenced and completed during the year, and hence it is highly essential that provision should be made for the erection and lighting of street lamps in these localities. It would be a great hardship on the property owners and a serious detriment to the city if no allowance should be made for the lighting of these new places; and capitalists would probably forego the erection of new buildings if it were understood that the streets would not be provided with gas lights.

At the very lowest calculation provision should be made for the erection and lighting of at least 300 new lamps.

The lighting of these, at an average of five months each, would amount to	$2,320 00
The fitting up of the same, to	2,400 00
New lamp-posts	3,210 00
Deficiency on present number of lamps	19,418 08
Total Deficiency	$27,348 08

It will therefore be seen in the foregoing statement that the gross amount of the lowest bids for the existing number of lamps is in excess of the amount available for the purpose, over $19,000, and the excess, including the necessary new lamps, is over $27,000.

Yours respectfully,

S. McCORMICK,

Supt. Lamps and Gas.

The Commissioner of Public Works offered for adoption the following:

Whereas, section 112 of chapter 335 of the Laws of 1873, provides that "no Department or officer shall incur any expense in excess of the sum appropriated;" and

Whereas, The gross amount of the lowest proposals for furnishing the gas to and lighting the public lamps which were opened on the 27th instant for the eight months from

May 1, 1880, to December 31, 1880, amounted to.....	$245,390 78
While the appropriation for lamps and gas available for the purpose is but.....	225,972 70
Showing an excess of the proposals of.....	$19,418 08

Which, together with the erection and lighting of the new lamps absolutely required, shows a total excess for the eight months of over $27,000 00; and

Whereas, The price of gas consumed in the public lamps, as fixed in the proposals, is largely in excess of the lowest price charged to private consumers; and

Whereas, The gas companies of this city have received valuable privileges, and are permitted to lay their pipes and conductors in its streets and public places without charge, and as the constant breaking up of the pavements entails a great expense upon the city, it seems but just that the city should be supplied with gas at rates at least as low as is charged to their most favored customers; therefore

Resolved, That the several proposals received on March 26 be and the same are hereby rejected, and that an advertisement be again issued on the 31st instant for proposals for lighting the city, to be opened on the 10th day of April, 1880.

The chairman put the question upon agreeing with the same, and it was decided in the affirmative.

On motion the Board then adjourned until Saturday, April 10, 1880, at 12 M.

SATURDAY, April 10, 1880.

All were present.

The minutes of the meeting of March 30, 1880, were read and approved.

The box containing the proposals was then opened and eight bids were found therein, and publicly read, as follows:

Company.	Gas.	Lamp-Post straightened.	Column releaded.	Column refitted.	Lamp removed.	Lamp reset.	New Lamp fited up	Remarks.
Manhattan	15 50	1 50	1 50	3 50	3 50	10	10	
New York	15 50	1 50	1 50	3 50	3 50	10	10	
Mutual	15 50	1 50	1 50	3 50	3 50	10	10	Schedule.
Municipal.....	19 00	1 50	1 50	3 50	3 50	10	10	
Metropolitan....	17 00	2	2	3	3	8	8	Schedule.
Harlem.....	17 20	2 50	2 50	3 50	3 50	8	8	
Yonkers.....	39 00	1	1	1 00	1 50	8	10	
N. Y. and N. J. Globe gaslight Company... ..	16 00	1 50	1 50	3 00	3 00	8	8	Naphtha lanterns; bid for portion of Harlem and Metropolitan Districts.

MONDAY, April 12, 1880.

The Gas Commission met in the office of the Commissioner of Public Works, at 1 o'clock P.M., Monday April 12, 1880.

All were present.

The minutes of the meeting of April 10, 1880, were read and approved.

The Secretary presented the following report:

Hon. Allan Campbell. Commissioner of Public Works—

[The proposals as stated in above table are given here].

The aggregate amount of the lowest of the foregoing bids, for gas, for the eight months of the fiscal year is.....	$234,585 37
The appropriation available for the purpose, is.....	231,023 69
Excess of bids over the amount available.....	$3,561 68

In this estimate allowance is made for the erecting and lighting of 390 new lamps during the balance of the fiscal year, while 800 new lamps were erected and lighted in 1879.

Yours, respectfully,

S. MCCORMICK,

Supt. Lamps and Gas, Secy.

The Commissioner of Public Works presented the following:

OFFICE OF THE N. Y. & N. J. GLOBE GAS LIGHT CO., (Limited), 152 BROADWAY, NEW YORK, April, 12, 1880.

Allan Campbell, Esq., Commissioner of Public Works:

Dear Sir—In view of the great saving we have made in the past, and of the good record of our light during the last contract, and from the fact that our bid is lower than either the Metropolitan or Harlem Companies, and that next year when the two upper wards have to be lighted, when we shall be able to effect a large saving, if now continued, we ask you to consider the matter of giving us at least 500 lamps in case any award is made.

Respectfully yours,

NICHOLAS R. CONNOR, *Secretary.*

The Mayor offered the following:

Whereas, The bids opened on the 10th inst. from the gas companies for lighting the street lamps (including 800 new lamps to be erected during the year. being the same number of new lamps as were erected last year), aggregate a sum greater than the appropriation available therefor:

Resolved, That the Gas Commission, before rejecting the bids, will adjourn to meet on Thursday, April 15, at 1 P.M., to afford an opportunity to the gas companies to reduce their bids if they see fit to do so.

The Chairman put the question upon agreeing with the same, and it was decided in the affirmative.

THURSDAY, April 15, 1880.

The Gas Commission met in the office of the Commissioner of Public Works, at 2 P.M., Thursday, April 15 1880.

The minutes of the meeting of April 12, 1880, were read and approved.

The Mayor presented the following communication:

OFFICE OF THE N. Y. & N. J. GLOBE GAS-LIGHT CO. (Limited), 152 BROADWAY, NEW YORK, April, 15, 1880.

To the Gas Commission of the City of New York:

Gentlemen—Availing itself of the opportunity given, this company hereby reduces the price for lighting 500 or more lamps in any district you may designate to $15 per lamp per annum, subject in all other respects to the specifications and obligations contained in its proposal dated the 10th instant.

Notwithstanding the efforts made by the gas companies affected by our proposal to prejudice the Gas Commission against the efficiency of this company's light, the fact remains that in 1877 we reduced the price of lighting the street lamps in Harlem from $36 to $26 per lamp; in 1878 from $26 to $21 per lamp, and in 1879 from $21 to $17.70 per lamp—this company having been then, as it now is, the only competitor of the old gas company. In view of that fact, this company claims to have been a successful competitor of value to the city.

We beg to remind the Gas Commission that the Twenty-third and Twenty-fourth Wards of this city are supplied by a monopoly, and next year practical opposition to such a monopoly can be offered by us, if competition be recognized and encouraged now.

We therefore respectfully ask an award to us of at least 500 lamps in the districts now lighted by either the Harlem or Metropolitan Gas Companies.

Very truly yours,

NICHOTAS R. CONNER, *Secy.*

Representatives from the New York, Manhattan, Mutual and Harlem Gas Light Companies were present, and, they desiring further time for consideration, on motion, the Board adjourned until Friday, April 16, 1880, until 1 P.M.

FRIDAY, April 16, 1880.

The Gas Commission met in the office of the Commissioner of Public Works, at 1 P.M., Friday, April 16, 1880.

All were present.

The minutes of the meeting of April 15, 1880, were read and approved.

The Mayor presented the following:

NEW YORK, April 16, 1880.

The Hon. Gas Commission:

Gentlemen—In order to meet the requirements of the public service. the undersigned hereby reduce their bids offered on the 10th inst. as follows:

For furnishing gas, including lighting, cleaning, etc., (as per specification) for the sum of $15 per lamp.

Bids for other services to stand as put in.

The Manhattan Gas Light Co., by Jas. W. Smith, *Sec.*

The New York Gas Light Co., by Thos. K. Lees, *Pres.*

The Metropolitan Gas Light Co., by O. Zollikoffer, *Pres.*

The New York Mutual Gas Light Co., by J. P. Kennedy, *Pres.*

OFFICE OF THE HARLEM GAS LIGHT CO., NEW YORK, April 15, 1880.

The Honorable Gas Commission:

Gents—In order to meet the requirements of the Gas Commissioners, the Harlem Gas Light Company will agree to reduce the price of their bid 20 cents per lamp, making the bid $17 for each lamp during the period from May 1, 1880, to April 30, 1881, provided all the lamps in our district are awarded to our Company. Respectfully, HARLEM GAS LIGHT CO.,

By R. W. RODMAN, *Vice-President.*

Which were ordered on file.

The Mayor then offered the following resolution:

Resolved, That in consideration of the public interests, we hereby determine and designate that the illuminating material to be used for lighting the public lamps from May 1st, 1880, shall be what is known as illuminating gas: adopted.

[The Mayor then offered for adoption resolutions awarding the contracts to the New York, Manhattan, Mutual, Metropolitan, and Harlem Companies, in accordance with their reduced bids; which were agreed to in the affirmative.]

THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY

A. M. CALLENDER & CO.,
PROPRIETORS.

Editor—G. WARREN DRESSER.

PUBLISHED ON THE 2ND AND 16TH OF EACH MONTH
At No. 42 Pine Street, New York.

This is a recognized official organ of—
LIGHT, HEAT, STEAM, WATER-SUPPLY,
VENTILATION, SANITARY IMPROVEMENT,
AND GENERAL SCIENCE.

TERMS

SUBSCRIPTION—Three Dollars per annum, in advance.

AGENTS

NEW YORK—AMERICAN NEWS CO., 39 and 41 Chambers St
BOSTON—S. M. PETTENGILL & CO., 6 State Street.
PHILADELPHIA—PRATT & CO., Corner 9th and Arch Streets.
England—C. W. HASTINGS, 22 Buckingham St., London, W. C.
Germany—B. WESTERMANN & CO., of New York

MONDAY, MAY 3, 1880.

Official Report of Examinations of Gas for two Weeks ending April 24, 1880, made at the Photometrical Room of the Department of Public Works.

Corrected Illuminating Power.

April 1880.	Time of Day at which Test were made.	New York Gas Light Co.	Manhattan Gas-Light Co.	Mutual Gas-Light Co.	Metropolitan Gas-Light Co.	Harlem Gas-Light Co.	Municipal Gas-Light Co.
		*	*	†	*	*	†
12	Between 9.30 A.M. and 1 P.M.	18.15	20.58	27.04	20.73	17.72	28.79
13		18.64	18.93	27.13	21.04	16.85	29.80
14		18.58	19.13	26.04	21.02	17.03	30.87
15		19.74	20.90	26.26	21.60	17.40	31.14
16		19.85	20.80	25.94	22.30	16 85	30.22
17		19.49	20.91	27.06	21.71	17.07	29.21
	Average	18.97	20.20	26.58	21.40	17.10	30.00
19		18.60	20.09	28.10	20.49	17.02	30.00
20		17 61	20.90	28.60	21.92	16.68	30.19
21		19.40	20.60	28.30	21.76	17.65	30.09
22		20.00	20.13	25.18	——	17.76	30.39
23		17.42	20.31	28.70	21.88	17.49	31.70
24		17.98	20.54	28.23	21.61	17.53	30.83
	Average	18.50	20.42	27.85	21.53	17.35	30.53

* Five foot lava tip with check.
† Bray's slit union, No. 7.

E. G. LOVE. Gas Examiner

Steel Rails.—For the moment, the rail mill of the Pennsylvania Steel Co. seems to be ahead in the race for the distinction of turning out the largest number of rails in a given time. On the 8th ult. the mill produced in "less" than 12 hours 936 finished steel rails, the average time to roll one rail being 46 seconds.—*Iron Age.*

Correspondence

[We are not responsible for the opinions expressed by Correspondents. Correspondents, in all cases, should sign their communications with their names and address in full—not for publiction, unless desired, but as a guarantee of good faith.—ED.]

Coke for Domestic Use.

ADRIAN, MICH., April, 1880.

Mr. Editor:—On reading the proceedings of the New England Association, published in the JOURNAL of April 2d, I feel prompted to write a few notes of my experience in regard to the coke question, and take the liberty of addressing the same to you. Should you think they would be of any value to the fraternity, use them to that end.

Like many gas men, I have known just what a nuisance coke can be when you have no use for it yourself and can find no one that has; but I took that as one of the difficulties I had to meet, and met it, as I think, successfully.

I first undertook to find its value in domestic economy, and ascertained that half a bushel, or twenty pounds, would run the No. 8 range in my own house, doing the cooking for five in family, and keeping fire fifteen hours per day, which, at our selling price of $5.50 per ton for crushed coke (50 bushels per ton), would cost 5½ cents a day, or $1.65 per month.

I found my customers were using wood, at an average of $4 per month. I sold them fire brick to line their stoves, and guaranteed to furnish fuel at $2 per month in some cases. To-day I have a market taking it as fast as I can make it. I do not have, after thoroughly screening it, sufficient breeze to run our boiler, which is a small upright.

I do not intend to state that $2 worth of coke will run any stove but the ordinary summer range such as is sold in New York for small families.

I have tried the mallets by hand, and they did well for a while. The mallets by steam did better for a longer time; but fifty or twenty-five cents per ton did not satisfy me with large percentage of waste. I wanted something better, so I looked the market through for a crusher, but could not find just what I wanted. I then made one, and it suits my company and myself perfectly.

We run it at a speed of five bushels per minute, which can be increased on this size machine to twelve bushels per minute, making easy work for three men and a small engine. It can also be regulated in a moment to any size, from nut to egg, and occupies a space of three feet square.

I am confident that it will pay any company, however large or small, to prepare a market for their coke, and also to prepare their coke for the market.

I make the quality of coke a point in selecting my gas coal, and find a great difference in the products of different mines.

I do not wish to trespass on your valuable time, but I have found the JOURNAL of great assistance, and desire, if I can, to make a slight return. If any of the fraternity feel sufficiently interested to inquire into the details I should be pleased to hear from them, or to show them the machine in operation at these works.

Should time and opportunity permit, I shall endeavor to exhibit my machine during the Annual Meeting of the Association at Chicago this fall.

Yours respectfully,
C. H. RAYNOR.

Gas Engines.

The Royal Society are to have a valuable addition to its apparatus, which may in time be looked upon as historical. The President, Mr. Spottiswoode, has promised an eight-horse gas engine, and Dr. Siemens has supplemented the gift by presenting two dynamo electric machines, which, while furnishing light for purposes of illumination on grand occasions and for experimental purposes generally, will remain as records of the condition of electric lighting in 1879.

The adoption of the gas engine in this connection is significant, and should relieve the minds of the holders of gas shares, for it points to the fact that when coal gas is superseded as an illuminating agent it will still be utilized for, among other purposes, obtaining motive power.—*British Mail.*

Protection of Iron from Rust.—Dr. Treumann. in a recent number of the *Deutsche Industrie Zeitung*, publishes a paper on "Means for Protecting Iron from Rusting." He appears to have made a most careful examination of all the processes, including Dr. Barff's, which have been introduced. He arrives at the conclusion that no processes are known at present which will keep iron effectively and durably from rust; that all protective compositions require careful supervision.—*British Mail.*

A Bill Regulating the Price of Gas.—ALBANY, April 19.—A bill was introduced in the Assembly to-day by Mr. Benedict, providing that all corporations engaged in the manufacture and sale of gas within the State of New York shall charge consumers such rates as may be agreed upon between the manufacturer and consumer.—*N. Y. Sun.*

Gas Stocks.

Quotations by G. W. Close Jr., Broker and Dealer in Gas Stocks.
(with W B Scott & Co.,)

34 PINE STREET, NEW YORK CITY.

MAY 3, 1880.

☞ All communciations will receive particular attention

☞ The following quotations are based on the par value of $100 per share. ☜

	Capital.	*Par.*	*Bid.*	*Asked.*
Gas Co.'s of N. Y. City.				
Central	466,000	50	50	60
Harlem	1,800,000	50	70	75
" Bonds	170,000			103
Manhattan	4,000,000	50	198	202
Metropolitan	2,500,000	100	138	—
" Scrip	$1,000,000	...	99	102
Mutual	5,000,000	100	80	85
" Bonds, gold	900,000	1000	100	—
Municipal	1,500,000	100	185	200
" Bonds	750,000		106	110
New York	4,000,000	100	103	106
Northern	270,000	50	—	100
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	127	130
Citizens	1,200,000	20	72	75
" S. F. Bonds.	320,000	1000	100	105
Fulton Municipal	1,500,000	100	94	97
Peoples	1,000,000	10	35	40
" Bonds	290,000	...	90	95
" Scrip	250,000	...	75	85
Metropolitan	1,000,000	100	60	70
Nassau	1,000,000	25	55	60
" Ctfs.	700,000	1000	85	95
Williamsburgh	1,000,000	50	72	77
" Scrip		...	98	103
Kings Co	135,000	100	—	50
" Bonds	40,000	—	—	—
Union Co. E. N. Y.		25	—	50
Richmond Co., S. I.	300,000	...	75	80
Out of Town Gas Companies.				
Bath, Maine	70,000	100		
Buffalo Mutual, N. Y	750,000	100	65	70
" Bonds	200,000	1000	95	100
Baltimore, Md.	2,000,000	100	185	190
" Ctfs., gold	1,000,000		—	103
Bayonne, N. J.		100		90
Brockport, N. Y.	25,000	100	...	80

Citizens, Newark.....	918,000	50	85	90
" " Bds.	124,000	—	105	10
Chicago Gas Co., Ills			125	—
Cincinnati G. & C. Co.				190
Derby of Conn.....	160,000	100	60	80
East Boston, Mass...		25	114	120
Elizabethtown, N. J.	300,000	20	—	130
Fort Wayne, Ind.....		100	...	—
Hannibal, Mo.....	100,000	100	95	100
Hartford, Conn.....	700,000	25	120	125
Hempstead, L. I....	25,000	100	...	—
Halifax N. S.....	400,000	40	148	150
Hamilton, Ontario...	150,000	40	117½	
Jersey City	750,000	20	155	160
Jamaica, L. I.....	25,000	100	...	—
Jacksonville, Ill.....	120,000	50	100	...
Lewistown Maine...	400,000	100	70	80
Laclede St Louis Mo.	1,200,000	100	93	96
Long Island		20	30	40
New Haven, Conn...		25	120	140
Peoples, Jersey City		...	40	50
" " Bds.				5
Peoples of Albany...	650,000	100	—	10
" Bonds	350,000	1000	—	-
Peoples of Baltimore		25	100	102
" Bonds....			106	—
Plainfield, N. J.....	80,000	100	—	105
Perth Amboy		25	—	95
Pittsfield, Mass.....			120	130
Rochester, N. Y.....		50	70	80
" Citizens		100	50	60
Rondout & Kingston			75	80
St. Louis Missouri..	600 000	50	300	—
Stillwater, Minn.....	50,000	50	—	26
Saugerties, N. Y	15,000	100	95	100
San Francisco Gas-Co., S. Fr'isco Cal.			82	83
Toledo, Ohio.....			95	97
Troy, Citizens.....	600,000	100	—	—
Washington, D. C...	1,500,000	20	170	185
" Scrip	500,000	20	100	110
Woonsocket, R. I....	150,000	100	80	...
Wilmington, Del....		50	174	...
Yonkers.....		50	—	70

Advertisers Index.

GAS ENGINEERS.

Page.

William Farmer, New York City..... 214
George W. Dresser, New York City..... 213

GAS WORKS APPARATUS AND CONSTRUCTION.

Herring & Floyd, New York City..... 211
T. F. Rowland, Greenpoint, L. I..... 211
J. W. Starr & Son, Camden, N. J..... 211
Delly & Fowler Philadelphia, Pa..... 211
Kerr Murray, Fort Wayne, Ind..... 211
George Stacey & Co., Cincinnati, Ohio..... 211
Bartlett, Robbins & Co., Baltimore, Md..... 211
Morris, Tasker & Co., Limited, Phila., Pa..... 207
P Munzinger, Phila., Pa 212
Brown & Owen, Phila, Pa..... 211

GAS AND WATER PIPES.

McNeals & Archer, Burlington, N. J..... 210
Gloucester Iron Works, Philadelphia, Pa..... 210
Robt. Campbell & Co., New York City..... 210
James Marshall & Co Pittsburgh, Pa..... 210
R. D Wood & Co., Philadelphia, Pa..... 210
S. Decatur Smith, Philadelphia, Pa..... 210
Warren Foundry and Machine Co..... 210
Pancoast & Tarr, 28 Platt Street, New York City..... 207

PIPE CUTTING MACHINES.

A. C. Wood, Syracuse, N. Y. 183

RETORTS AND FIRE BRICK.

J. H. Gautier & Co., Jersey City, N. J..... 208
B. Kreischer & Sons, New York City..... 208
Adam Weber, New York City..... 208
Laclede Fire Brick Works, St. Louis, Mo..... 208
Brooklyn Retort and Fire Brick Works..... 208
Borgner & O'Brien, Phila., Pa..... 208
Gardner Brothers, Pittsburgh, Pa..... 208
Henry Maurer, New York City..... 208

DIETERICH'S REGENERATOR FURNACE.

Chas. F. Dieterich, Baltimore, Md... 190

GAS METERS.

Harris, Griffin & Co., Philadelphia, Pa..... 214
American Meter Co., New York and Philadelphia, Pa. 215
The Goodwin Gas Stove and Meter Co., Philadelphia, Pa 215
Harris, Heime & McIlhenny, Philadelphia, Pa..... 215

GAS STOVES.

The Goodwin Gas Stove and Meter Co., Phila., Pa. ... 216
Retort Gas Stove Co., Providence, R. I..... 192

VALVES.

Ludlow Valve Manufacturing Co., Troy, N. Y..... 209

EXHAUSTERS.

P. H. & F. M. Roots, Connersville, Ind.. 209
Smith & Sayre Manufacturing Co., New York City..... 209

GAS COALS.

Penn Gas Coal Co., Philadelphia, Pa..... 213
Perkins & Co., New York City..... 212 213
Cannelton Coal Co., " " " " 213
New York & Cleveland Gas Coal Co., Pittsburgh, Pa.... 213
Newburgh Orrel Coal Co., Baltimore, Md..... 213
Despard Coal Co., Baltimore, Md..... 213
Tyrconnell Coal Co., Baltimore, Md..... 213
Fort Pitt Gas Coals..... 213
West Fairmont and Marion Coal Co., N. Y. City..... 213
Montauk Gas Coal, New York City. 212

GAS ENGINES.

Schleicher, Schumm & Co., Philadelphia, Pa..... 183

STREET LAMPS.

J. G. Miner, Morrisania, N. Y. City..... 212

BURNERS.

C. Gefrorer, Philadelphia, Pa..... 207

PURIFYING MATERIAL.

Connelly & Co., Pittsburgh, Pa. 206

TAR BURNER, AND BLOWER FOR BURNING BREESE.

H. E. Parson, New York City..... 207

PROCESSES.

Strong Gas-Fuel and Light Co. 206
Gwynne Harris, New York City..... 210

GAS FIXTURES.

Mitchell, Vance & Co., New York City..... 209

CEMENT.

S. L. Merchant, New York City..... 209
F. O. Norton, New York City..... 209

BOOKS.

Economy of Gas as a Fuel..... 206
Scientific Books..... 210
Cathels, Gas Consumer's Manual..... 215
Fodell's Book-Keeping..... 215
Sanitary Engineer..... 215
Journal des Usines a Gaz..... 207
Review of Gas and Water Engineering..... 212
Gas Analyst's Manual..... 211

Grand Hotel,

INDIANAPOLIS, IND.

The Leading Hotel of Indiana, and the only strictly First-Class Hotel in Indianapolis.

Centrally located, only one and a half squares from the Union Depot, and one square from the Hall used by the Gas Manufacturers.

Regular rates, $2.50, $3.00, and $3.50 per day. *Spacial rates to members attending the Meeting of the Western Gas Association, $2.00 per day.*

Many of the more prominent gas men are already located at the Grand Hotel.

GEO. F. PFINGST,
Proprietor.

WANTED,

FOR A LARGE MANUFACTORY,

A GAS ENGINEER,

Thoroughly understanding coal gas machinery, and a person of good address. Address,

501-2t LOCK BOX 12, PHILA., PA.

HYDRAULIC MAIN

For Sale, Cheap.

We offer for sale eight (8) sections of the Stanley Hydraulic Main, with two take-off ends, blank heads, tar valve, and dip-pipes complete. The Main is for setting of sixes, with seven-inch dip pipes.

CITIZENS' GAS LIGHT CO.,
501-2t ROCHESTER, NEW YORK.

PROPOSALS.

THE PRESENT CONTRACT OF LIGHTING THE CITY OF GUAYAQUIL BEING ABOUT TO CONCLUDE IN MARCH, 1881, THE TOWN COUNCIL

SOLICITS OFFERS FOR

Lighting said City with Gas

OR ANY BETTER ARTICLE.

The contractor may calculate on 600 lights as a basis, more or less. The proposals must be addressed to MR. GREGORIO DE YCAZA, President of the Town Council of Guayaquil, Ecuador, and will be received not later than July 31st next.

GUAYAQUIL, March 29, 1880.

PEDRO J. NOBOA, Secretary.

For further particulars, apply to R. and C. DEGENER, 50 Wall Street, New York City. P. O. Box 4279. 501-4t

FOR SALE,

A SMALL AND PROFITABLE GAS WORKS,

In a thriving town of 3000 inhabitants. 2000 feet of Natural Gas per day. For particulars apply at office of this Journal, or to McNAB & MARS, 36 Cortland St., New York.

WATER GAS.

Strong Gas-Fuel and Light Co.,

No. 120 Broadway,

(EQUITABLE BUILDING), NEW YORK.

This Company is the Sole Proprietor for the State of New York of the Strong and Lowe Processes for the Manufacture of Water Gas.

Works are now being constructed according to the Strong patents at Yonkers, to supply that city with gas for

Light, Heat, and Power.

One pair of generators, the cost of which will not exceed $18,000, will make about 400,000 cubic feet per day.

The Lowe system is already in successful operation for lighting in more than thirty places in the United States, and in many of our large cities.

The rapid progress that water gas is making in the public favor, and the great economy and efficiency of the Strong and Lowe processes over all others for its manufacture, should secure for these processes a careful examination on the part of all gas companies now existing or about to be formed.

N. B.—For licenses or further information, appply at the office of this company, as above.

Dated March 8, 1880.

CONNELLY & CO.,

SOLE MANUFACTURERS OF

Iron Sponge Purifying Material

AND

CONNELLY'S JET EXHAUSTERS.

PITTTSBURGH, PA.

"How to Burn Gas."

Under this title a neat little book has been issued containing the paper of Mr. Jas. Somerville, as read at the last meeting at Cincinnati, together with a table, taken from Prof. Chandler's lecture, showing the loss of light resulting from the use of shades, etc., of different kinds of glass.

The book is intended for sale to Gas Companies to distribute gratuitously among consumers. If Gas Companies can induce their consumers to use better burners and shades, one-half of the fault-finding will cease.

The price is $10 per thousand. Orders may be sent to the office of this Journal.

MORRIS, TASKER & CO., LIMITED.

MANUFACTURERS AND BUILDERS OF

GAS WORKS.

PLANS, SPECIFICATIONS, AND ESTIMATES FOR WORK ERECTED OR ON CARS IN PHILADELPHIA.

WROUGHT IRON ROOF FRAMES.—For Slate or Corrugated Iron, with Cast Iron Cornice Gutter, Iron Doors and Frames, Wrought Iron Pivot Window Blinds, and all kinds of Castings and Smiths' Work for Buildings.

BENCH CASTINGS.—Retorts, and all castings and Wrought Iron Work for setting them on the best plan. Tar Gates, Wrought Iron Stand Pipes, Retort Lids, Cotter Bars, Coal and Coke Wagons, and Stokers' Tools.

EXHAUSTERS.—Exhausters and Compensators, By-Passes, to pass from 4,000 to 150,000 cubic feet of gas per hour, with Engines, Governors, Pressure and Vacuum Gauges.

SCRUBBERS.—Cataract, Single and Multitubular, Spray and Tower Scrubbers.

CONDENSERS.—Single and Multitubular Air and Water Condensers.

PURIFIERS.—For purifying from 1,000 to 2,000,000 cubic feet capacity daily, with either wet or dry Lime, or Oxide of Iron, and with either Ash Riveted Wrought or Cast Iron Lime Sieves.

CARRIAGES.—Movable Lifting Carriages for Purifiers, arrranged either for Floor or Overhead use.

METERS.—Square and Round Meters of any capacity.

GAS HOLDERS.—Single Lift and Telescopic Gas Holders, with Cast or Wrought Iron Suspension Frames, Housed or Open, Flat Top or Trussed.

GAS GOVERNORS.—Station Governors, with Regulating and Indicating Columns for Inlet and Outlet Pipes.

STOP VALVES.—Double Faced Stop Valves for Gas or Water, from three to twenty-four inches diameter. Flange and Bell Pipes, Fitting and Drips of all descriptions. Steam Boilers and Hot Water Apparatus for Heating, Building and Gas Holder Tanks, Lamp Posts and Lanterns.

PATENT SELF-SEALING RETORT LID. PATENT SEALING AND UNSEALING DIP PIPES.

MORRIS, TASKER & CO., Limited,

WORKS: FIFTH and TASKER STS., Phila. *OFFICE: 230 S. 3d. St. Phila.*

CAST IRON PIPE.

WE HAVE ON HAND, IN STORE, FOR IMMEDIATE SHIPMENT,

A Large Quantity of Cast Iron Pipe,

WITH A FULL ASSORTMENT OF SPECIAL CASTINGS.

MOST OF THEM ARE GAS WEIGHTS—PART OF THEM COATED WATER WEIGHTS.

Made by Warren Foundry, Wood, McNeals, and Camden Iron Works,

UNDER CAREFUL INSPECTION, AND ARE OF THE VERY BEST QUALITY.

PANCOAST & TARR, 28 Platt St., New York.

JOURNAL des USINES a GAZ.

Issued on the 5th of each Month.

THIS JOURNAL CONTAINS ALL THE LATEST SCIENTIFIC AND PRACTICAL INFORMATION RELATING TO GAS MANUFACTURE IN FRANCE.

MESSRS. SERVIER, MONNIER, AND ROUGET, EDITORS AND MANAGERS.

Subscriptions Received at this Office. **Price, Post-paid, $3.50 Per Annum.**

Complete Gas Works

FOR SALE.

The Iron Work for a complete Gas Works, with 8 inch connections, consisting of 4 Purifiers, 8 ft. by 10 ft., with Dry Centre Valve, Multitubular Condenser, Scrubber, Bye-pass Valves, 5 feet Station Meter, and Bench Casting for four benches of 5's. All nearly new, and in good condition.

THE MUTUAL GAS LIGHT CO.,

497 tf ST. JOSEPH, MISSOURI.

C. GEFRORER.

Manufacturer of

GAS BURNERS

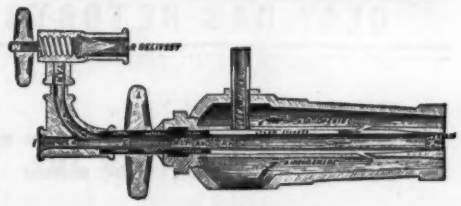
GAS HEATING AND COOKING APPARATUS.

FITTERS' PROVING APPARATUS, ETC.

No. 248 North Eighth Street, Philadelphia.

PARSON'S

TAR BURNER.



SIMPLEST, CHEAPEST, BEST.

Will be sent to any Gas Works on Trial. Satisfaction Guaranteed.

ALSO

PARSON'S BLOWER,

FOR BURNING BREESE, SLACK & FINE COAL.

NOW IN USE AT THE BROOKLYN GAS LIGHT CO.

See Col. Armington's remarks at meeting of the New England Association of Gas Engineers, as reported in this journal of April 2.

H. E. PARSON,

WATERTOWN, N. Y., and 42 PINE ST. ,N. Y. CITY.

ENGAGEMENT DESIRED.

A Person of Practical Experience as Superintendent of Gas Works

Desires an engagement where strict attention to the duties confided to him will secure ultimately a fair compensation. References can be given. A good, permanent position is desired, where future salary would depend on success of management. Address, "ENGAGEMENT,"

Office GAS LT. JOURNAL

J. H. GAUTIER & CO.,
CORNER OF
GREENE AND ESSEX STREETS,
JERSEY CITY, N. J.
MANUFACTURERS OF
Clay Gas Retorts,
Gas House Tiles,
Fire Bricks, Etc. Etc.
Ground Clay, Fire Brick and Fire Sand in Barrels,
J. H. GAUTIER.
C. E. GREGORY
393-1y

BROOKLYN
Clay Retort & Fire Brick Works,
(EDWARD D. WHITE & CO.)
Manufacturers of Clay Retorts, Fire Brick, Gas House and other Tile.
VAN DYKE, ELIZABETH, RICHARDS & PARTITION STS.
Office, 88 Van Dyke St., Brooklyn, N. Y.

LACLEDE
FIRE BRICKS AND
GAS RETORT WORKS
CHELTENHAM, MO.
Hand and Machine made Retorts and Settings, Superior Fire Bricks for Siemans Gas and Glass Furnace. Bricks and Tiles for Whitwell's Hot Blast Ovens, Blast Furnace and Cupola Tiles, Etc.
Fire Bricks and Tiles
of all shapes and sizes.
Glass Pot Clay. Fine Ground Clay and Fire Bricks. Sewer Pipe, Etc.
901 Pine Street, St. Louis, Mo.
642—

ESTABLISHED IN 1845.
B. KREISCHER & SONS,
OFFICE FOOT OF HOUSTON ST., E.R., N.Y.
Gas Retorts,
TILES, FIRE BRICK.
AND EVERYTHING IN THE FIRE CLAY LINE.

MANHATTAN
FIRE BRICK & ENAMELLED CLAY
RETORT WORKS.
ADAM WEBER.
CLAY GAS RETORTS
AND RETORT SETTINGS,
FIRE BRICKS, TILES, ETC.,
Office and Works, 15th Street and Avenue C., N. Y.

Borgner & O'Brien,
MANUFACTURERS OF
CLAY GAS RETORTS
AND RETORT SETTINGS,
FIRE BRICKS, TILES, ETC.
23d St., Above Race,
PHILADELPHIA.
TWENTY YEARS' PRACTICAL EXPERIENCE.

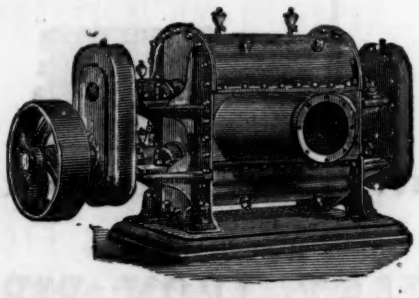
Works, LOCKPORT, PA.
GARDNER BROTHERS,
—ESTABLISHED 1864.—
Works, MT. SAVAGE JUNCTION, MD.
CLAY GAS RETORTS, RETORT SETTINGS, FIRE BRICK, TILES, Etc.
MINERS & SHIPPERS OF FIRE CLAY.
OFFICE, 116 SMITHFIELD ST., PITTSBURGH, PA.
C. H. SPRAGUE, No. 13 EXCHANGE PLACE, BOSTON, MASS., Agent for the New England States.

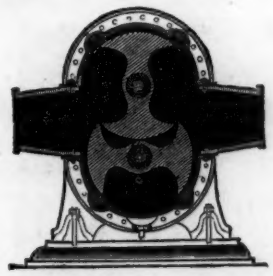
OFFICE, 418 to 422 East 23d St., New York. ESTABLISHED 1856. WORKS, PERTH AMBOY, NEW JERSEY.
HENRY MAURER,
Excelsior Fire Brick & Clay Retort Works
CLAY GAS RETORTS, BENCH SETTINGS, FIRE BRICK, TILES, ETC.

—THE—
ECONOMY OF GAS AS A FUEL
FOR
COOKING PURPOSES.

This is a small Pamphlet containing the Paper read by
MR. WILLIAM W. GOODWIN, OF PHILADELPHIA, PA.,
At the recent meeting of the American Gas Light Association.
IT IS INTENDED FOR GRATUITOUS DISTRIBUTION BY GAS COMPANIES AMONG THEIR CONSUMERS
Price, Twelve Dollars per Thousand.
ALL ORDERS TO BE SENT TO
A. M. CALLENDER & CO., No. 42 Pine Street, New York.

P. H. & F. M. Roots'





IMPROVED GAS EXHAUSTER

With Engine on same Bed Plate, or without.

BYE-PASSES, GAS VALVES, GOVERNORS, ELBOWS, PIPE-FITTINGS, &C., FURNISHED TO ORDER.

P. H. & F. M. ROOTS, Patentees and Manufacturers, **CONNERSVILLE, IND.**

S. S. TOWNSEND, General Agent, 6 Cortland St. and 8 Dey St., N. Y.
JAS. BEGGS & CO., Selling Agents, 8 Dey St., N. Y.
WM. COOKE, Selling Agent, 6 Cortland St., N. Y.

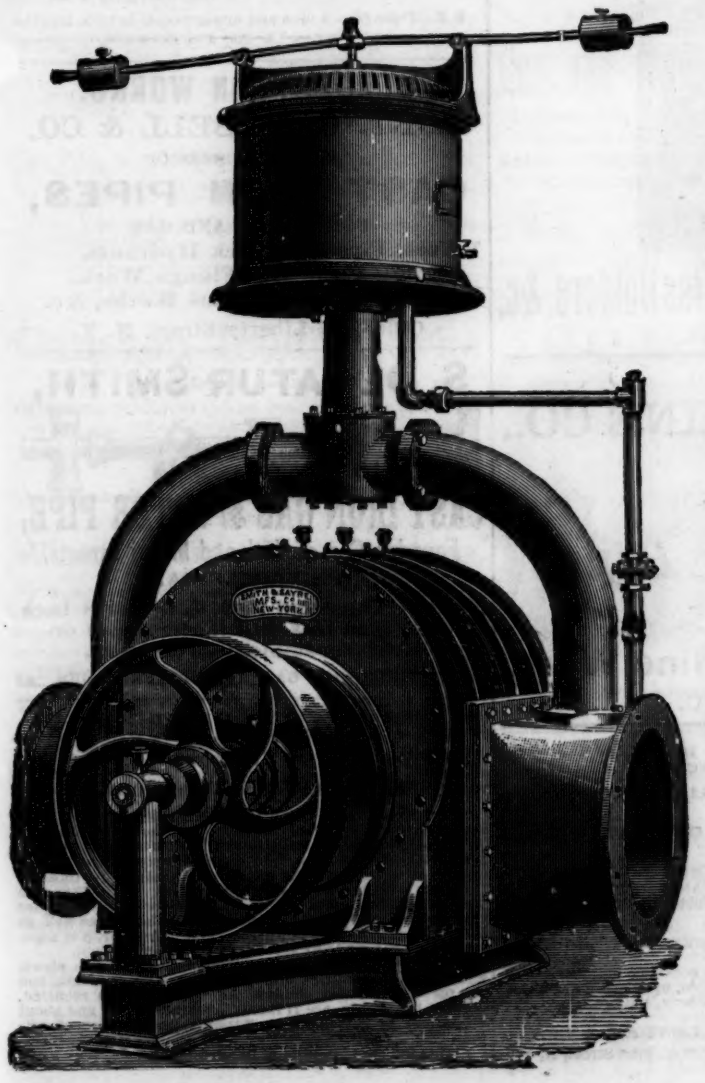
Send for Illustrated Catalogue and Price List.

SMITH & SAYRE MANUFACTURING COMPANY.

Coal and Iron Exchange, 21 Cortlandt Street, N. Y

BUILDERS OF

Machinery and Apparatus for Gas Works.



MACKENZIE'S PATENT ROTARY AND STEAM JET GAS EXHAUSTERS, GOVERNORS, COMPENSATORS, BY-PASSES, CONDENSERS, WASHERS, SCRUBBERS.

ISBELL'S PAT. AUTOMATIC STREET PRESSURE GOVERNOR.

HIGH SERVICE GOVERNOR, GAS AND WATER VALVES, HYDRAULIC MAIN DIP REGULATOR, BENCH CASTINGS, Etc. PURIFYING BOXES, TOWER SCRUBBERS, WITH AUTOMATIC WATER DISTRIBUTOR. *ISBELL'S PATENT SELF-SEALING RETORT DOORS.*

Plans and Estimates for the Improvement, Extension, or Alteration of Gas Works, or for the Construction of New Works.

G. G. PORTER, *President* CHARLES W. ISBELL, *Secretary.*

MITCHELL, VANCE & CO.

Manufacturers of

CHANDELIERS!

And Every Description of

GAS FIXTURES,

Also Manufacturers of

Fine Gilt Bronze and Marble Clocks, warranted best Time-keepers Mantle Ornaments, &c.

Salesroom, 836 BROADWAY.

NEW YORK.

Special designs furnished for Gas Fixtures for Churches Public Halls, Lodges. &c.

LUDLOW

Valve Manf'g Co.,

OFFICE AND WORKS

938 to 954 River Street and 67 to 83 Vail Ave.

TROY, NEW YORK.

BRASS AND IRON SLIDE VALVES.

(Double and Single Gate ¼ inch to 36 inch—outside and inside screws, Indicator etc.) for Gas, Water and Steam—

HYDRAULIC MAIN DIP REGULATORS.

ALSO

FIRE HYDRANTS.

REFERENCES FURNISHED.

SEND FOR CIRCULARS.

Portland Cement,
Roman Cement.
Keene's Cement,
Sellars Gas Cement.

English Fire Brick, No. 1.
" Silica Fire Brick.

IMPORTER

S. L. MERCHANT,

41 Broadway, New York,
Just below Trinity Church. 344-1y

☞ Remit 25 cents postage for "Practica Treatise on Cement.

F. O. NORTON,

MANUFACTURER OF

Hydraulic Cement,

Specially adapted for gas works. Under water it is capable of giving better results than Portland or any other cement.

90 BROADWAY (Cor. Wall St.,) NEW YORK.

Preserve the Journal!

We will furnish to our subscribers an important article for *preserving in a convenient form*, the numbers of the Journal as it is issued at the very low price of $1.25. Sent either by Express or Mail, as directed.

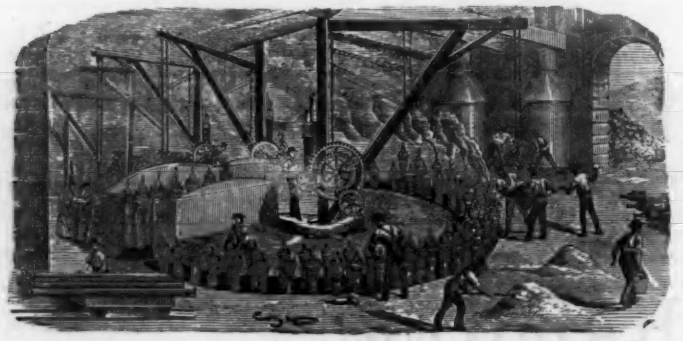
By mail the postage will be 20 cents, which will be added to the price of the Binder. Send orders to

A. M. CALLENDER & CO,
42 Pine Street, Room 18, New York.

M'NEALS & ARCHER,

BURLINGTON. N. J,

Flange-Pipes



Ceneral Foundry Work.

CAST IRON PIPES

FOR WATER AND GAS.

DAVID S. BROWN, President.
BENJAMIN CHEW, Treasurer,

JAMES P. MICHELLON, Secretary,
WILLIAM SEXTON, Superintendent.

GLOUCESTER IRON WORKS,

GLOUCESTER CITY N. J.

CastIron Gas & Water Pipes, Stop Valves, Fire Hydrants, Gas Holders. &c.

Office No. 6 North Seventh Street, Philadelphia.

ESTABLISHED 1856.

WARREN FOUNDRY AND MACHINE CO,,

WORKS AT PHILLIPSBURGH, N, J.
NEW YORK OFFICE, 153 BROADWAY.

Cast Iron Water and Gas Pipe

FROM TWO TO FORTY-EIGHT INCHES DIAMETER.
ALSO ALL SIZES OF

FLANGE PIPE for Sugar House and Mine Work.

Branches, Bends, Retorts, Etc., Etc. 486-1

SCIENTIFIC BOOKS.

We are prepared to furnish to GAS MANAGERS and others interested in the topics treated of, the following Books, at prices named:

GAS MANUFACTURE, by WILLIAM RICHARDS. 4 to, with numerous Engravings and Plates, in Cloth binding. $12.

THE GAS ANALYST'S MANUAL, by F. W. HARTLEY. $2.50.

ANALYSIS, TECHNICAL VALUATION, PURIFICATION and USE OF COAL GAS, by Rev. W. R. BOWDITCH, M. A., with Engravings. 8 vo Cloth. $4.50.

NEWBIGGINS HAND BOOK, by THOMAS NEWBIGGIN, C. E. $2.75

GAS CONSUMERS HAND BOOK, by WM. RICHARDS. C. E. 18 mo. Sewed. 20 Cents.

GAS CONSUMERS MANUAL, by E. S. CATHELS, C.E. 10 Cents.

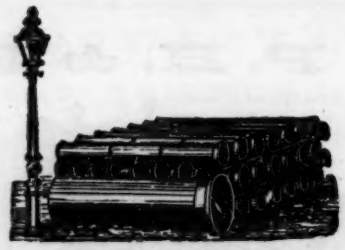
PRACTICAL TREATISE ON HEAT, by THOMAS BOX. Second edition. $5.

AIR AS FUEL, OR PETROLEUM AND OTHER MINERAL OILS UTILIZED BY CARBURETTING AIR, by OWEN C. D. ROSS, Member Institute Civil Engineers. 8 vo. Cloth. $1.50.

The above will be forwarded by Express, upon receipt of price.

We will take especial pains in securing and forwarding any other Works that may be desired, upon receipt of order. All remittances must be made by Check, Draft, or Post Office Money Order.

A. M, CALLENDER & CO.,
Room 18, No. 45, Pine Street, N. Y.



R. D. WOOD & CO.,

PHILADELPHIA.

MANUFACTURERS OF

CAST IRON PIPE

FOR GAS AND WATER

Lamp Posts, Valves, Etc.

Mathew's Pat. Anti-Freezing Hydrants,

400 Chestnut Street.

JAMES MARSHALL & CO.

Franklin Foundry and Pipe Works,

MANUFACTURERS OF

GAS, WATER, AND OIL PIPES

Works, 18th, 19th, 20th and Railroad Street.
Office, No. 23 Nineteenth Street.

Pittsburgh, Pa.

N.B.—Pipes from 3-inch and upwards cast in 12 ft. lengths.
☞ Send for Circular and Price List.

BERGEN IRON WORKS.

ROBT. CAMPBELL & CO.

MANUFACTURERS OF

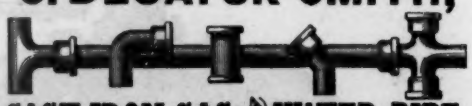
CAST IRON PIPES,

FOR WATER AND GAS,

Valves, Fire and Dock Hydrants,
Lamp-Posts and Flange Work,
Bench Castings for Gas Works, &c.

Office, 85 Liberty Street, N. Y.

S. DECATUR SMITH,



CAST IRON GAS & WATER PIPE,

Foundry, Cor. of York and Moyer Streets,

PHILADELPHIA.

Several Thousand 2, 3, 4, 6 and 8 Inch Cast Iron *Gas and Water Pipes* on hand, for immediate delivery.

☞ FITTINGS FOR GAS AND WATER MAINS. ☜

NATIONAL COAL GAS COMPANY.

320 Broadway, N. Y., Rooms 50, 51 & 52.

H. P. ALLEN, President.

The process known as GWYNNE-HARRIS but from later most essential improvements more appropriately called the ALLEN-HARRIS, or AMERICAN HYDROCARBON process for making "Water Gas," by the decomposition of superheated steam, in fire-clay retorts, set similarly to those in Coal Gas Works, is an established success. More than One Hundred Million cubic feet of gas have been made under this process, and for *permanency* and *brilliancy*, as well as economy both to the manufacturer and consumer, it is superior to any gas made by the old, or any other method.

Our process is *not intermittent* but continuous. The steam and the oil are admitted into the retorts by gauge cocks, and run for days without change. All the materials required, besides the steam, are 17 lbs. of Anthracite coal and about 3¼ gallons of Petroleum or Naphtha, per 1000 feet of brilliant gas.

Rights for sale. Inquire of the President.

Kerr Murray,

PRACTICAL GAS ENGINEER,

AND MANUFACTURER OF

ALL THE LATEST IMPROVED

Gas Apparatus,

MACHINERY,

ETC., ETC.

—WORKS,—

South of Railroad Depot,

FORT WAYNE, IND.

BARTLETT, ROBBINS & CO.,

ARCHITECTURAL IRON WORKS.

MANUFACTURERS OF

GAS HOLDERS, BENCH CASTINGS, MULTITUBULAR WATER AND AIR CONDENSERS, COMMON AND TOWER SCRUBBERS, ROTARY & STEAM JET EXHAUSTERS, WROUGHT IRON ROOF FRAMES.

MANUFACTURERS OF ALL DESCRIPTIONS OF GAS APPARATUS.

WORKS:

Cors. Pratt, Scott, McHenry, Ramsay and Bartlett Streets.

BALTIMORE, MARYLAND.

Plans, Specifications, and Estimates furnished. Correspondence solicited. 467-1y

---

JESSE W STARR & SON,

Camden Iron Works

Camden, New Jersey,

Office in Philadelphia No. 435 Chestnut St., where a member of the Firm can be seen between 12 m. and 2 p. m. daily.

MANUFACTURERS OF

ALL KINDS OF CASTINGS AND APPARATUS FOR GAS WORKS,

Wrought Iron Roof Frames.

For Retort and other houses. Retorts and all castings required for setting them in the latest and most improved model. WASHERS, CONDENSERS, SCRUBBERS and EXHAUSTERS for relieving the Retorts from pressure. PURIFIERS, varying from 2,000 to 2,000,000 cubic feet daily purifying capacity.

Wrought Iron Lime Sieves

or Purifiers. Station Meters of all sizes.

GAS HOLDERS.

TELESCOPIC AND SINGLE

With cast iron guide and suspension frame GAS GOVERNORS or REGULATORS, STREET MAINS, from 1½ to 48 INCHES DIAMETER, for WATER or GAS. Street Main connections, such as BRANCHES, BENDS, DRIPS, SLEEVES, etc.

STOP VALVES, from 3 to 30 inches, for both Water and Gas.

Wrought Iron Work.

All the Smith and Sheet Iron work required in and about Gas Works. 996-tf

JESSE W. STARR. JESSE W. STARR, JR.

1842. DEILY & FOWLER 1880

LAUREL IRON WORKS.

ADDRESS, 39 LAUREL STREET,

PHILADELPHIA.

MANUFACTURERS OF

GAS HOLDERS,

SINGLE AND TELESCOPIC—WITH CAST OR WROUGHT IRON GUIDE FRAMES.

We are prepared to furnish Holders, Wrought Iron Roof Frames, Bench Castings, Condensers, Scrubbers, Purifiers, Drips, Bends, Tees, and all other Iron Work connected with Gas Works. We have built 12 gas works and 122 gasholders. Personal supervision given to the erection of all our work. Holders built at following places since 1868:

Lancaster, Pa. (2)
Williamsport, Pa. (3)
Bristol, Pa. (2)
Catasaqua, Pa.
Kittanning, Pa.
Hazelton, Pa.
Freeport, Pa.
Huntingdon, Pa.
Pittston Pa.
Bethlehem (S). Pa.
Sharon, Pa.
Cantor, Pa.
Carlisle, Pa.
Beaver Falls, Pa.
Annapolis, Md. (2)
Parkersburg, W. Va.
Lynchburg, Va.
Stanton, Va.
Youngstown, O
Steubenville, O.
Zanesville, O.
Mansfield, O.
Marion, O.
Bellaire, O.
Athens O.
Barnesville, O.
Newark, O.
Columbus, O.
Franklin, Ind.
Indianapolis, Ind.
Jacksonville, Ill.
Joliet, Ill.
Lawrence, Kansas.
Jefferson City, N. O. La. (2)
Algiers, N. O., La.
Kalamazoo, Mich
Buffalo, N. Y. (2)
Cadensburg, N. Y.
Waverly, N. Y.
Little Falls, N. Y.
Penn Yann, N. Y.
Watkins, N. Y.
Coney Island, N. Y.
Batavia, N. Y.
Gloucester, N. J.
Salem, N. J.
Mount Holly, N. J.
Plainfield, N. J.
Englewood, N. J.
Flemington, N. J. (2)
Dover, Del.
Pittsfield, Mass.
Meriden, Conn.
Milwaukee, Wis.
Burlington, Vt.
Hoosick Falls, N. Y.
Attica, N. Y.

BROWN & OWEN,

MANUFACTURERS OF

EVERY DESCRIPTION OF

Gas and Water Works Supplies.

Particular attention given to the alteration of old works. Estimates and Drawings furnished.

THOS. R. BROWN, Late Chief-Eng. Phila. Gas Works. **R. PITT OWEN.**

Address all communications to

N. W. Cor. 12th and Noble Streets,

482-1y **PHILADELPHIA.**

HERRING & FLOYD,

Oregon Iron Foundry

738, 740, 742 and 744 Greenwich St., N. Y

MANUFACTURERS OF

ALL KINDS OF CASTINGS AND APPARATUS FOR GAS-WORKS.

BENCH CASTINGS from benches of one to six Retorts each.

WASHERS: MULTITUBLAR AND AIR CONDENSERS CONDENSERS; SCRUBBERS, (wet and dry), and **EXHAUSTERS** for relieving Retorts from pressure.

BENDS and BRANCHES of all sizes and description.

FLOYD'S PATENT **MALLEABLE RETORT LID.**

BUTLER'S **COKE SCREENING SHOVELS.**

SABBATON'S PATENT **FURNACE DOOR AND FRAME.**

SELLER'S CEMENT for stopping leaks in Retorts.

GAS GOVERNORS, and everything connected with well regulated Gas Works low price, and in complete order.

N. B.—**STOP VALVES** from three to thirty inches—at very low prices.

SILAS C. HERRING. JAMES R. FLOYD

GEO. STACEY. HENRY BANSHAW. WM. STACEY

GEO. STACEY & CO.

MANUFACTURERS OF SINGLE AND TELESCOPIC

GAS-HOLDERS

AND ALL KINDS OF

Cast and Wrought Iron Work

Used in the Erection of Gas and Coal Oil Works.

Foundry on MILL STREET; Nos. 33, 35, 37 and 39

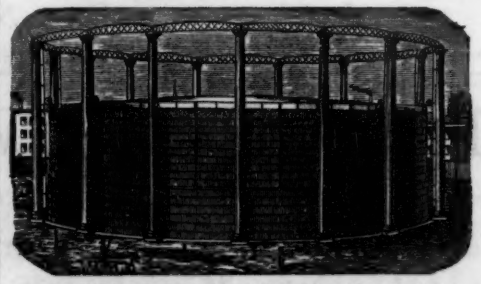
Office and Wrought Iron Works on RAMSAY STREET Cincinnati, Ohio.

REFERENCE.

Cincinnati Gas-Light Co.
Indianapolis Gas Co.
Dayton, O., Gaslight Co.
Covington, Ky., Gas Co.
Springfield, O., Gas Co.
Terre Haute, Ind., Gas Co.
Madison, Ind., Gas Co.
Kansas City, Mo., Gas Co.
Topeka, Kansas, Gas Co.
Burlington, Iowa, Gas Co.
Nashville, Tenn., Gas Co.
Baton Rouge, La., Gas Co.
Saginaw, Mich., Gas Co.
Oshkosh, Wis., Gas Co.
Peoria, Ill., Gas Co.
Quincy, Ill., Gas Co.
Champaign, Ills., Gas Co.
Carlinville, Ill., Gas Co.
Bowling Green, Ky., Gas Co.
Hamilton, Ohio, Gas Co.
Vicksburg, Miss., Gas Co
Denver City, Col., Gas Co.

R. T. Coverdale, Eng'r Cincinnati, and others.

CONTINENTAL WORKS.



GASHOLDERS OF ANY MAGNITUDE.

T. F. ROWLAND, Proprietor,

GREENPOINT, BROOKLYN, N. Y

ENGINEER AND MANUFACTURER OF

GAS-HOLDERS,

CONDENSERS, SCRUBBERS, VALVES, PURIFIERS, RETORTS, and HYDRAULIC MAINS,

and all other articles connected with the Manufacture and Distribution of Gas. Plans and Specifications prepared and Proposals given for the necessary Plans for Lighting Cities, Towns, Mansions, and Manufactories.

THE GAS ANALYST'S MANUAL.

BY F. W. HARTLEY, A.I.C.E., M.S.E. **E. & F. N. SPON, PUBLISHERS.**

PRICE, $2.50.

CONTENTS. SECTION I.—The purposes of photometry. Standard light. Standard burner. Gas Works Clauses Act Amendment Act, 1871:—Regulations in respect of testing apparatus, mode of testing for illuminating power, and for sulphuretted hydrogen. Description of standard apparatus. The photometer room. Preparation of candles. Testing operations. Readings. Correction for gas consumpt. Corrections for candles' consumpt. Corrections for barometric pressure and temperature. Ordinary photometers. The inferential or jet photometers. To set the jet photometer at work. To rate the jet photometer.

SECTION II.—Duration and mode of testing in London, sulphuretted hydrogen, ammonia, sulphur compounds. Preparation of solutions. Fitting up. To set the apparatus at work. Analysis.

SECTION III.—Ammonia. Sulphuretted hydrogen. Carbonic acid. The Cooper's Tube, or Endiometer. To calculate weight of sulphur. Harcourt's color test. A rapid and accurate methodof estimating sulphur in coal gas. Specific gravity. To find the specific gravity of dry gas. To correct the bulk and find the weight of gas.

APPENDIX.—Rules and tables to facilitate the calculations necessary in the determination of the illuminating valu and degree of purity of coal gas. Photometry. Ammonia and sulphur. Proving of testing meters in London. The referee's cubic-foot measure. Times and mode of testing for pressure in London. Proposed standards of light.

A. M. Callender & Co., 42 Pine Street, N. Y.

NEWCASTLE AND PROVINCIAL GAS COALS.

THE UNDERSIGNED ARE PREPARED TO EXECUTE ORDERS FOR

NEWCASTLE COAL (TOWNLEY),

ALSO FOR THE BEST QUALITIES OF

PROVINCIAL GAS COAL,

DELIVERED AT ANY PORT IN THE UNITED STATES.

We supplied nearly 100,000 tons of Provincial Coal to some twenty-five different Gas Companies in 1877. These coals will yield in practical use fully

10,000 Cubic Feet of 16 1-2 Candle Gas---40 Bushels Coke.

JAMES D. PERKINS.
F. SEAVERNS.

PERKINS & CO 41 SOUTH STREET, NEW YORK.

Montauk Gas Coal,

FROM

TAYLOR CO., WEST VA.

JOHN WHITE,

AGENT,

Room 15, Trinity Building,

NEW YORK.

THE AMERICAN GAS-LIGHT JOURNAL.

$3 PER ANNUM.

"SCOTT'S" OCEAN MINE
Youghiogheny Gas Coal.

The undersigned, agents for the above well-known Gas Coal, are prepared to contract for its delivery at any point in New York and New England. Shipments made immediately if desired.

PERKINS & CO.,
41 SOUTH STREET, NEW YORK, Box 3695.

THE ECONOMY
OF
GAS AS A FUEL
FOR
Cooking Purposes.

Price, $12 a Thousand.

KING'S TREATISE
ON
COAL GAS.

Vol. I., Bound in Cloth, $10.

A. M. CALLENDER & CO., 49 Pine Street, N. Y.

P. MUNZINGER,

Engineer and Contractor,

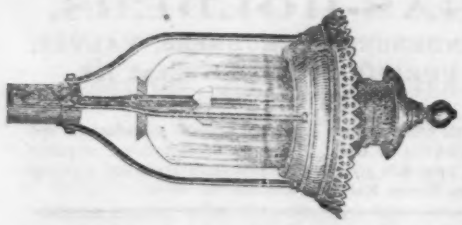
No. 1211 MARKET STREET, PHILADELPHIA, PENN.

BUILDER AND CONSTRUCTOR OF ALL KINDS OF GAS MACHINERY,

ON THE LATEST AND MOST IMPROVED PLAN.

Bench Castings, Condensers, Scrubbers, Purifiers,
Centre Valves, Gasholders, Stop Valves, Etc., Etc.

Estimates and Drawings Furnished upon Application.



THE GLOBE STREET LAMP,

Miner's Patent Lamps for Streets, Depots, Ferries, etc., in Various Styles, are Solely Manufactured by

Jacob G. Miner,

MORRISANIA, N. Y. CITY.

N. B.—These Lamps in many cases are the cheapest to commence with, always cheapest in the end.

Review of Gas and Water Engineering.

ISSUED EVERY ALTERNATE FRIDAY.

Edited and Published by CHAS. W. HASTINGS, 8 Buckingham St., London, Eng.

Each number contains articles in connection with the manufacture and supply of Gas; summary of latest intelligence on the subject of Electric Lighting; articles upon Water Supply; also on the Construction and Maintenance of Gas, Water, and Sewage Works.

Price, 10s., Postpaid.

The Gas and Water Companies' Directory.

Edited and Published Annually by CHARLES W. HASTINGS.

This Work gives a complete list of all Gas and Water Companies throughout England, Scotland, Ireland and Wales; date of formation, amount of capita and names of all officers, etc.; including carbon returns, prices paid for gas, dividends, etc.

Price, in Cloth Covers, 5s.; Paper Covers, 3s. 6d. Postage Extra.

Address, 8 BUCKINGHAM STREET,
Orders Received at this Office. LONDON, W. C., ENGLAND.

NEW YORK AND CLEVELAND

GAS COAL COM'Y

Of Pittsburgh, Pa.

MINERS AND SHIPPERS OF

YOUGHIOGHENY GAS COAL.

This Company is prepared to furnish any amount of their justly celebrated, and acknowledged superior GAS COAL, to any point reached by railroad or navigation. on most favorable terms.

General Office—89 Wood Street,
PITTSBURGH, PA.

Branch Office—120 Water Street,
CLEVELAND, OHIO.

WILLIAM A. McINTOSH, President.
A. CARNEGIE, Vice-President.
W. P. DE ARMIT, Treasurer.
THOMAS AXWORTHY. Agent at Cleveland, Ohio.

351-1y

THE NEWBURGH

Orrel Coal Company,

Mines at Newburg, Preston County, W. Va.
Company's Office, No. 52 S. Gay Street, Baltimore, Md.
C. OLIVER O'DONNELL, Pres't. CHAS. MACKALL, Sec'y.
CHAS. W. HAYS, Agent in New York, Room 7, Trinity Building, 111 Broadway.

This Company offer their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizen's Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and the Providence Gas Light Company, Providence, R. I.

Best dry coals shipped from Locust Point, wharves, and prompt attention given to orders for chartering of vessels.

224-1y.n

THE DESPARD COAL COMPANY
OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies throughout the country.

Agents, PARMELEE BROTHERS, No. 32 Pine street, N. Y.
BANGS & HORTON, No. 31 Duane street, Boston.
Mines in Harrison County, West Virginia.
Wharves Locust Point, } Baltimore.
Company's Office, 15 German St., }

Among the consumers of Despard Coal, we name: Manhattan Gas Light Company, New York; Metropolitan Gas Light Company, New York; Jersey City Gas Light Company, N. J.; Washington Gas Light Company; Portland Gas Light Company, Maine

. Reference to them is requested. 204-

TYRCONNELL GAS COAL.,

MINED IN TAYLOR COUNTY, WEST VA.

Company's Office, 52 S. Gay St., Baltimore.

CHARLES MACKALL, Secretary.

CHARLES W. HAYS, Agent, Room 7, 111 B'way, N. Y.

SHIPPING POINT—Baltimore, Md.

This coal yields 10,000 cubic feet of Gas with an illuminating power of over 16 candles. Forty bushels of very superior coke, with little Ash and scarcely any clinker 94-1y

---

GEO. W. DRESSER,

CIVIL ENGINEER.

TRINITY BUILDING

ROOM 89. 111 BROADWAY.

GAS COALS.

THE

PENN GAS COAL COMPANY

OFFER THEIR

COAL, CAREFULLY SCREENED,

AND PREPARED FOR

GAS PURPOSES.

Their Property is located in the Youghiogheny Coal Basin, near Irwin's and Penn Station on the Pennsylvania Railroad, and on the Youghiogheny River.

OFFICES

No. 209 South Third Street, Phil'a. 90 Wall Street, New York.

PLACES OF SHIPMENT.

Pennsylvania Railroad, Pier No. 2 (Lower Side).
Greenwich Wharves, Delaware River.
Pier No. 1 (Lower Side), South Amboy, N. J.

366-1y

CANNELTON COAL COMPANY

Miners of the celebrated CANNELTON CANNEL, acknowledged to be the *best enricher* produced in this country, yielding 10,000 cubic feet of 64.54 candle gas per ton of 2,240 pounds.

J. TATNALL LEA, Treasurer, P. O. Box 1747 Philadelphia.

SALES AGENTS: PERKINS & CO., New York. DANIEL W. JOB & CO., Boston. MAYER, CARROLL & CO., Baltimore.

The West Fairmont and Marion Consolidated Coal Company,

Mines at Fairmont, West Virginia,

OFFER FOR SALE THEIR

VERY SUPERIOR GAS COAL,

IN ANY QUANTITY DESIRED, on the shortest notice, at their office, 231 BROADWAY, New York

---

FORT PITT GAS COAL

THE FORT PITT COAL CO.

OFFER THEIR CELEBRATED

Fort Pitt Gas Coal,

Carefully Screened and Prepared for Gas Purposes, Delivered at any Point reached by Railroad or Navigation, on the Most Favorable Terms.

Office, No. 337 Liberty Street,

PITTSBURGH, PENN.

Box 314. J. E. McCRICKART, Manager.

PERKINS & CO.,

41 SOUTH STREET N. Y.

IMPORTERS AND AGENTS FOR THE SALE OF

AMERICAN, PROVINCIAL, and ENGLISH

GAS COALS AND CANNEL.

JAMES D. PERKINS. F. SEAVERNS, Jr.

"HOW TO BURN GAS,"

TEN DOLLARS PER THOUSAND.

A. M. CALLENDER & CO., 42 PINE STREET, NEW YORK.

INTERNATIONAL--1876--EXHIBITION.

The U. S. Centennial Commission

HAVE DECREED AN AWARD TO

HARRIS, GRIFFIN & CO.,

12th and Brown Sts., Philadelphia, and 49 Dey St., N. Y., U. S. A.,

FOR THE FOLLOWING REASONS:

The Exhibit consists of a Series of METERS from the Largest Size Station Meters for the use of the MANUFACTURE OF GAS, to those for the use of the ORDINARY CONSUMER. The Instruments are WELL MADE, RELIABLE as to INDICATION, and embody a number of sundry improvements which with the general character of the Exhibit, entitle the whole to commendation.

Attest—J. L. CAMPBELL, Secretary, pro-tem.

Signed—A. T. GOSHORN, Director General

J. R. HAWLEY, President.

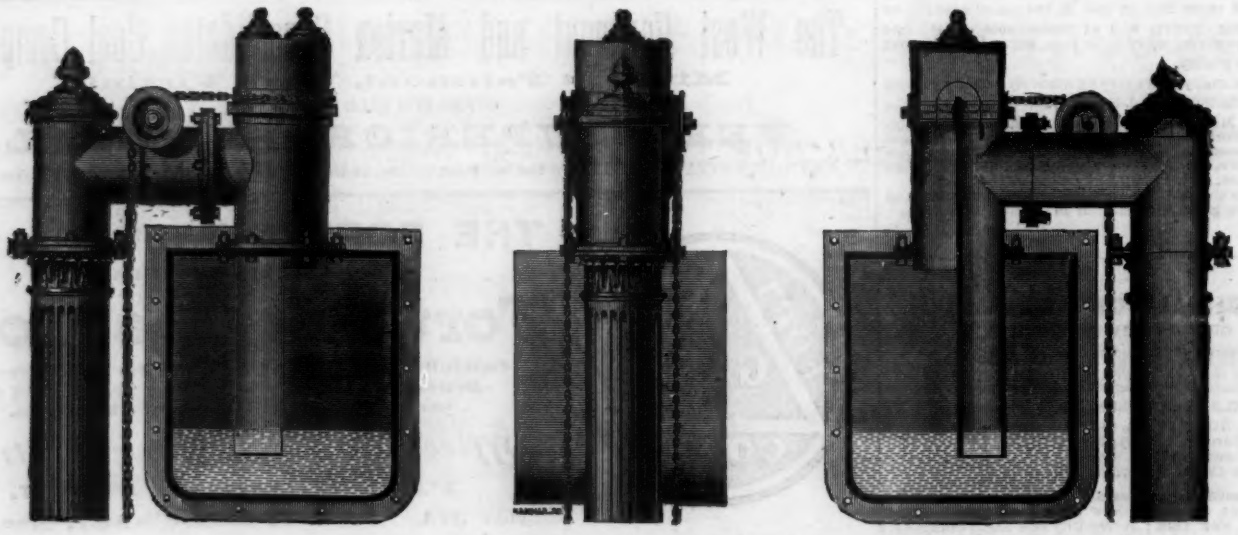
GROUP JUDGES.

AMERICAN.

PROF. JOSEPH HENRY, LL.D., Secretary of Smithsonian Institution, Washington, D. C.
PROF. F. A. P. BARNARD, S.T.D., LL.D., President of Columbia College, N. Y.
PROF. J. E. HILGARD, Washington, D. C.
PROF. J. C. WATSON, Ann Arbor, Michigan.
GENERAL HENRY K. OLIVER, Salem, Massachusetts.
GEORGE F. BRISTOW, New York.

FOREIGN.

SIR WILLIAM THOMSON, LL.D., D.C.L., F.R.S., Great Britain
JUL. SCHIEDMAYER, Germany.
MR. E. LEVASSEUR, France.
P. F. KUPKA, Austria.
EDW. FAVRE PERRET, Switzerland.



FARMER'S PATENT BYE-PASS DIP-PIPE.

WILLIAM FARMER,

ARCHITECT AND GENERAL GAS ENGINEER,

ROOMS 87, 89, 91, 111 BROADWAY, NEW YORK.

WILLIAM FARMER may be consulted upon all matters relating to the Manufacture of Illuminating Gas. Will furnish Specifications, Drawings, and Estimates for the Erection of Gas Works of any Capacity, and will erect the same either on Commission or by Contract.
Having made the Construction of Gas Works a Specialty, perfect satisfaction can be guaranteed.
Sole Agent for the FOULIS HYDRAULIC MACHINE for Drawing and Charging Retorts.
Sole Agent for the AITKEN and YOUNG PROCESS FOR MAKING ILLUMINATING GAS.

PATENTEE OF THE FOLLOWING INVENTIONS.

EXHAUSTER (Screw Propeller) for Gas or Air, and Condensation. **DUMPING BARROW** for Wheeling Coal, Coke and Lime, Etc. **HYDRAULIC MAIN** for Reducing Pressure on Retorts. **ZIGZAG SCRUBBERS** for Naphthalizing the Gas and Removing the Tar, Ammonia, and Naphthaline. **BYE-PASS DIP PIPE** for reducing the Pressure on Retorts, Etc., as per cut above. **SELF-ACTING WATER DISTRIBUTOR** for Scrubbers and Washers, Etc. **MOVABLE DIP PIPE** for Reducing and Equalizing the Pressure on Retorts. **TOWER SCRUBBERS** (Jacketed) for Economizing Space and Building Material. **DUPLEX CENTRE SEAL** for Keeping all the Boxes in a set continuously in action.

REFERS BY PERMISSION TO THE FOLLOWING GENTLEMEN.

Professor B. SILLIMAN, New Haven, Conn.
GEN. CHAS. ROOME, President Manhattan Gas-Light Company, N. Y.
GEN. A. E. BICKENLOOPER, President Cincinnati Gas-Light Co., Cincinnatti, Ohio.
A. W. BENSON, President Brooklyn Gas-Light Company, Brooklyn, N. Y.
D. HOSTETTER, President Pittsburgh Gas-Light Co., Pittsburgh, Pa.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
S. L. HUSTED, President Laclede Gas-Light Company, St. Louis, Mo.
E. VANDERPOOL, Engineer, Newark Gas-Light Company, Newark, N. J.

T. C. HOPPER, Prest. and Gen. Supt. WM. H. HOPPER, Vice-Prest. WM. N. MILSTED, Treas. WM. H. DOWN, Sec.

AMERICAN METER COMPANY,

WET AND DRY GAS METERS. PRESSURE REGISTERS. METER PROVERS.
STATION METERS. PRESSURE & VACUUM REGISTERS. PORTABLE TEST METERS.
EXHAUSTER GOVERNORS. PRESSURE & VACUUM GAUGES. EXPERIMENTAL METERS.
DRY CENTRE VALVES. CRESSON GAS REGULATORS. AMMONIA TEST METERS.
GOVERNORS FOR GAS WORKS. MARSLAND WATER METERS. BAR AND JET PHOTOMETERS.

Manufactories:
512 W. 22d St., N. Y.
Arch & 22d Sts., Phila.

GAS STOVES—AMERICAN, FRENCH, & ENGLISH.
SUGG'S ILLUMINATING POWER METER.
SUGG'S "STANDARD" ARGAND BURNERS. ALSO NN AND TTT.
Wet Meters, with Lizar's "Invariable Measuring" Drum.
SOLE AGENTS FOR THE ALLEN EXHAUSTER GOVERNOR.

Agencies:
37 Water Street, Cincinnati.
20 South Canal Street, Chicago.
810 North Second Street, St. Louis.
122 & 124 Sutter St., San Francisco.

HELME & McILHENNY,

Successors to Harris & Brother.

ESTABLISHED 1848.

PRACTICAL GAS METER MANUFACTURERS,

Continue as heretofore at the OLD ESTABLISHMENT, Nos. 1115 and 1117 Cherry Street, Philadelphia, Pa.,

To manufacture Wet and Dry Gas Meters, Station Meters, Experimental Meters, Meter Provers, Centre Seals, Governors, Pressure Registers, Indicators, Photometers, and all kinds of Gas Apparatus; Also furnish all other Articles appertaining to the use of Gas Works.

From our long Practical Experience of the Business (covering a period of 33 years) and from our personal supervision of all Work, we can guarantee all orders to be executed promptly, and in every respect satisfactorily.

WILLIAM HELME. JOHN McILHENNY.

WM. WALLACE GOODWIN, Prest. and Treas. WM. H. MERRICK, V.-Prest. H. DUMONT WAGNER, Supt. S. L. JONES, Sec. S. V. MERRICK, Asst. Sec.

THE GOODWIN GAS STOVE AND METER COMPANY,

Successors to W. W. GOODWIN & CO.

No. 1012, 1014 and 1016 Filbert Street, Philadelphia, Pa.

No, 142 Chambers Street, New York

MANUFACTURERS OF GAS STOVES FOR COOKING AND HEATING PURPOSES.

Dry and Wet GAS METERS, Station Meters (Square, Cylindrical or in Staves) Glazed Meters, King's and Sugg's Experimental Meters, Lamp Post Meters, Etc., Etc., Meter Provers (sizes 2, 5 and 10 feet), Pressure Guages of all kinds, Pressure Registers, Pressure and Vacuum Registers, Pressure Indicators (sizes 4 inch, 6 inch and 9 inch), King's Pressure and Vacuum Gauges, Dry and Wet Centre Seals, Dry and Wet Governors, Exhauster Governors, Photometers of all descriptions. Letheby's Sulphur and Ammonia Test Apparatus complete—also Testing and Chemical Apparatus of all kinds, and of the most perfect description, for all purposes relating to Gas.

Goodwin's Improved Lowe's Jet Photometer.

Special attention to repairs of Meters, and all apparatus connected with the business.
All work guaranteed first class in every particular, and orders filled promptly.

THE PLUMBER

AND

SANITARY ENGINEER.

HAS BEEN ENLARGED, AND WILL NOW BE

Published on the First and Fifteenth of each Month,

Instead of Monthly. It will contain many new and valuable features, and thus be indispensable to everyone professionally interested in its special field—*Lighting, Heating, Ventilation, Water Supply, and Drainage.*

Regular Contributors:

EDW. S. PHILBRICK, C.E. GEO. E. WARING, JR., C.E. Prof. HENRY MORTON, Ph.D.
ROBERT BRIGGS, C.E. T. O'CONOR SLOANE, Ph.D. DR. JOHN H. BILLINGS, U.S.A.

Price, $2 a Year. Single Copies, 10 Cents.

THE PLUMBER & SANITARY ENGINEER,
P. O. Box 3037. 140 WILLIAM STREET, New York.

NOW READY AND FOR SALE,

FODELL'S
System of Bookkeeping

FOR GAS COMPANIES.

Price $5, which should be sent either in Check, P. O. Order or Registered Letter.

Blank Books, with printed headings and forms on this system, will be supplied to Gas Companies, by applying to W. P. FODELL Philadelphia, or

A. M. CALLENDER & CO
OFFICE GAS LIGHT JOURNAL, 42 Pine St., N. Y

CATHEL'S
GAS CONSUMERS MANUAL,

Enables every Gas Consumer to ascertain at a glance, without any previous knowledge of the Gas Meter, the quantity and money value of the Gas consumed. Also the best method of obtaining from Gas the largest amount of its light.

It will be to the advantage of Gas Companies to supply their Consumers with one of these Guides, as a means of preventing complaints arising from their want of knowledge in regard to the registration of their meters. For sale by

A. M. CALLENDER & CO.
42 Pine Street, New York, Room 18.

NOTICE TO GAS COMPANIES.

OFFICE OF THE GOODWIN GAS STOVE AND METER COMPANY,
1012, 1014, 1016 FILBERT ST., PHILA., & 142 CHAMBERS ST., N. Y.

The addition to our business of a department for the manufacture and sale of Stoves for Cooking and Heating by Gas, and the large proportions which this branch is already assuming, has suggested to us the propriety of associating others with us in the management of our business, whereby its increasing labor will be divided, and greater means commanded for its extension, in both the old and new departments.

With these objects in view, the business formerly conducted under the firm name of W. W. GOODWIN & Co., will be continued under the corporate title of "THE GOODWIN GAS STOVE AND METER COMPANY," at the old stand, Nos. 1012, 1014, and 1016 Filbert Street, Philadelphia, and at the branch house, No. 142 Chambers Street, New York, which continues under the management of Capt. Wm. Henry White. The Company will continue to manufacture Consumers', Experimental, and Show Meters of all varieties; Meter Provers, Pressure Registers, Pressure and Vaccuum Registers, Photometrical, Chemical and Testing Apparatus of all kinds, and of the most perfect workmanship.

With grateful recollections of the liberal patronage of our friends in the past, during a period of unexampled depression in trade, as well as when our business was in its infancy, we feel that now, with improved facilities and more prosperous times, we may confidently look forward to an increase of that business which it will be our pride to merit.

The officers of the Company are: W. W. Goodwin, President and Treasurer; Wm. H. Merrick, Vice-President; H. Dumont Wagner, Superintendent; S. Lewis Jones, Secretary; Samuel V. Merrick, Assistant Sec.

WILLIAM W. GOODWIN, President.